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ABSTRACT

This report describes the status of this pilot satellite television project for the state of Alaska which provides for the distribution of television programming to the RCA Toll Centers in Anchorage, Fairbanks, Juneau, Sitka, and Bethel, as well as to 23 selected rural sites. The historical background is discussed, as well as the process involved in the project's development, the system as it now exists, and its utilization. Economic factors are described, and alternative means for programming distribution and financing are considered. Conclusions and recommendations for the remainder of the project close the report. Appendices include the contract for services between Alaska and RCA Alaska Communications, Inc. (RCA Alascom) and a detailed description of services provided for both interstate and intra-state satellite television networking. (Author/RAO)

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SATELLITE TELEVISION DEMONSTRATION PROJECT

PRELIMINARY REPORT

March 15, 1977

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Prepared by the
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SECTION I. INTRODUCTION

This report describes the status of the Television Demonstration Project (TVDP) as authorized in Section 1. of HCSSB 696, passed by the Ninth Legislature of the State of Alaska. This Bill appropriated $1.5 million to the Office of Telecommunications (OT), Office of the Governor, to demonstrate the feasibility of distributing television via communications satellite in Alaska. Subsequent sections of this report will discuss the historical background leading to the passing of HCSSB 696, the process involved in the project's development, the system as it now exists and its utilization. Economic factors are described and alternative means for programming distribution and financing are discussed. Finally, conclusions and recommendations for the remainder of the project are made.

The approach that has been taken in the implementation of the TVDP is not intended as a recommendation for continuing operations. The tight time schedule of the TVDP required making the best use of existing facilities and organizations which do not necessarily represent the best way of providing the desired services on an ongoing basis. The primary objective was to implement service in order to obtain data needed for planning the operational system; or, in fact, determining whether or not an operational system is feasible.

To this date, the project is performing very well, especially in light of the many organizations involved and the complex problems in technical, legal, financial and logistic areas. Although we had hoped to initiate operations in the fall of 1976, it was not possible to consummate agreements in time so the system was not turned on until mid-January 1977.

This project was made feasible because of the small earth station program, authorized by the Legislature, and managed by the Office of Telecommunications. In this pro-

gram, State funds are used to purchase earth station equipment which is then installed and operated by RCA Alascom under an interim arrangement before the Federal Communications Commission. During the development of this program, OT addressed the overall system configuration and specific technical characteristics in the context of an integrated state-wide system to provide all types of communication services. Our concept was to make sure that the same facilities could handle not only emergency/medical communications and telephone service, but also carry computer data, television and other signals without requiring extensive rebuilding. In the past, the State's communications needs have been considered, for the large part, on a piecemeal basis.

It is emphasized that OT has been designated by the Legislature to manage a pilot project to provide television in selected locations only for a one-year period. We do not advocate OT's participation in an operational program but feel that it is not inappropriate for us to serve as a coordinator and a catalyst in order to stimulate initial action. From a more pragmatic viewpoint, OT represents the only agency in the State with the technical and management capability currently available to run the project. Legislative intent clearly states that an objective is. . ."to determine the best technical and administrative procedure for a state-wide program." To this we would add the task of determining acceptable means to ensure that the system can be financially supported.

We hope that this report will give the reader a clear understanding of the development of the project, showing the evolution of ideas with the changing of viewpoints and positions and the overcoming of obstacles to get us where we are at this time. We further hope that the effort to date will lay the foundation for quality planning of future services.

SECTION II. BACKGROUND

Since its commercial introduction following World War II, television has become a dominant factor in American society. More households have television than telephones. Television influences an individual purchase of chewing gum, the election of a President, and the scheduling of Olympic Games. Television first came to Alaska in 1953 when a cable system was installed in Ketchikan. Now 85 percent of Alaska's population can view television, but there seems to be more interest in "bringing television" to Alaska than in other area of communications. The 15 percent who have no television are clamoring for some. Those who have one channel want more. If programming is delivered via video tape, viewers want timely material on a real time basis.

Until initiation of the Television Demonstration Project video programming was supplied in several ways: from conventional broadcast stations, translators, mini-TV transmitters, and cable systems. Practically 100 percent of the programming has been obtained from video tapes shipped from the outside and, with few exceptions, causing a delay of from one week to several months. Some news programming and sports events were brought in via commercial satellite circuits.

The various facilities for distributing television programming in Alaska are described below.

COMMERCIAL BROADCAST STATIONS

Commercial broadcast stations are located in Anchorage, Fairbanks, Juneau and Sitka. The signals from many of these stations are extended to outlying communities through translator systems. The commercial broadcast stations in Alaska are listed below:

ANCHORAGE:

KENI-TV Channel 2, 26.5 kw visual, NBC affiliate owned by Midnight Sun Broadcasters, Inc., Anchorage, Alaska. KENI coverage is extended by translators to North Kenai, Seldovia,

Aleyeska, Girdwood, Palmer, Sutton, Wildwood, Copper Landing, Seward, Soldotna and Whittier.

KIMO-TV Channel 13, 30.4 kw visual, ABC affiliate owned by Central Alaska Broadcasting, Inc., Anchorage, Alaska. KIMO coverage is extended by translator to North Kenai, Soldotna, Sutton and Whittier.

KTVA-TV Channel 11, 26.3 kw visual, CBS affiliate owned by Northern Television, Inc., Anchorage, Alaska. KTVA coverage is extended by translator to Sutton, Talkeetna, Soldotna, North Kenai and Seldovia.

FAIRBANKS:

KFAR-TV Channel 2, 5.37 kw visual, NBC/ABC affiliate owned by Midnight Sun Broadcasters, Inc., Anchorage, Alaska. KFAR coverage extended by translator to Delta/Ft. Greely, Nenana, Gakona, Tolsona, Paxson, Copper Center, Glenallen, Willow Mountain and Delta.

KTVF-TV Channel 11, 27.5 kw visual, CBS/ABC affiliate owned by Northern Television, Inc., Anchorage, Alaska. Programs extended by translator to Delta/Ft. Greely, Tok/Tanacross, Usibelli and Nenana.

JUNEAU:

KINY-TV Channel 8, 239 w visual, NBC/ABC affiliate owned by Midnight Sun Broadcasters, Inc., Anchorage, Alaska. Translators serve Mendenhall Valley and Douglas.

SITKA:

KIFW-TV Channel 13, 199 w visual, CBS/ABC affiliate owned by Sitka Broadcasting Incorporated.

PUBLIC BROADCAST STATIONS

These television stations are publicly supported, noncommercial broadcast stations. Funding for their operation usually comes from federal, State and local sources. Programming can be obtained from a variety of sources and is usually educational or of a type not available through commercial sta-

tions. In the field of public broadcasting, the Alaska Public Broadcasting Commission, comprising nine members appointed by the Governor, is charged with encouraging the development and successful operation of educational radio and television stations through: (1) the provision of technical assistance, and (2) making grants of State funds to local nonprofit corporations for construction and operation of stations.

There are three public broadcast television stations in the State as follows:

KUAC-TV Channel 9, 56.2 kw visual, PBS Network licensed by the University of Alaska, Fairbanks, Alaska. Translators at Nenana, Healy, Delta and Tok.

KYUK-TV Channel 4, 4.68 kw visual, PBS Network licensed by Bethel Broadcasting Corporation, Bethel, Alaska. KYUK's programming can be received virtually throughout the Yukon-Kuskokwim Delta by means of the most extensive translator system in the State. Translators carry the KYUK signal north to St. Michael, northwest to Stony River, south to Cape Newenham, southwest to Kipnuk and east to Cape Romanzoff.

Communities receiving KYUK's signal directly include Akiachak, Amauthluak, Eek, Kasigluk, Kwethluk, Napakiak, Napaskiak, Nunapitchuk, Oscarville, Tuluksak and Tuntutuliak. Among those receiving the signal through translators are Aniak, Chevak, Cape Romanzoff, Chuathbaluk, Chefornak, Hooper Bay, Kipnuk, Kongiganak, Kwigillingok, Mekoryuk, Mountain Village, Pilot Station, Pitkas Point, Red Devil, Russian Mission, Quinhagak, St. Mary's, St. Michael, Sheldon Point, Sleetmute, Stony River, Toksook Bay and Tununak.

KAKM-TV Channel 7, 70 kw visual, PBS Network licensed by Alaska Public Television, Inc., Anchorage, Alaska. Translators extend KAKM's signal to Hope, Girdwood, Sutton, North Kenai, Sterling, Kenai, Soldotna and Seward.

MINI-TRANSMITTER STATIONS

The State of Alaska has pioneered this class of station. Mini-transmitter stations usually utilize modified translator

station equipment of one to ten watt power output. The programming source for the mini-TV stations is from a tape recorder, cameras or other local equipment. Mini-transmitter stations and associated equipment are usually owned and licensed by the community. Programming is obtained from video tapes supplied by the Alaska Public Broadcasting Commission and other sources available to the community.

Mini-TV stations have also been used at many construction camps along the Trans-Alaska Pipeline. Programming for these stations is usually obtained through video tape recordings of programs provided by commercial broadcast stations.

The mini-transmitters operating in Alaska (exclusive of those associated with the TVDP) are listed below:

COMMUNITIES SERVED BY MINI-TRANSMITTERS

Ft. Yukon
King Cove
Kiana
Kivalina
St. Paul
St. George
Sand Point
Unalaska
Yakutat

In most instances owner/licensee is the community served.

TRANS-ALASKA PIPELINE CAMPS SERVED BY MINI-TRANSMITTERS

Coll Foot
Old Man
Franklin Bluff
Galbraith
Atigun
Chandler
Dietrich
Prospect
5-Mile
Delta
Toolik
Livengood
Foggy Valley
Pump Station #10
Pump Station #3
Pump Station #12
Valdez
Camp Lonely
Atlantic-Richfield

Transmitting equipment is owned by pipeline companies. Licensees are held jointly by Northern Television Inc. and Midnight Sun Broadcasters Inc., both of which provide program tapes for the camps.

AMERICAN FORCES TELEVISION (AFTV)

Television stations are located at several military bases throughout the State. These stations are part of the American Forces Television Network which provides entertainment and informational programming for military personnel at remote locations. While these stations are designed primarily for military bases, their signals are often usable at nearby civilian communities. In the Bristol Bay areas, a system of translators installed by the State extends the signal from King Salmon Air Force Base to Dillingham and several other communities in the Dillingham area. The City of Galeta operates a translator which retransmits the signal from the AFTV Station at Galena.

AFTV broadcast stations are also located at Elmendorf Air Force Base, Galena, King Salmon, Shemya, Tatalina, Sparrevohn and Cold Bay.

TRANSLATORS

There are several dozen television translator stations throughout the State. These stations pick up the signal from a primary broadcast station or another translator and rebroadcast the signal for extended coverage. Translators are often located on mountaintops or other locations where signals from distant stations can be received and retransmitted these signals to locations which cannot receive them directly.

Translators are often owned and licensed by broadcast stations as a means of extending their coverage within their market area. The State of Alaska has also installed translator systems bringing television into areas which could not otherwise receive it. In some cases the communities have installed their own translators.

Following is a list of translators currently in service.

LOCATION	STATION CARRIED	LICENSEE	COMMUNITIES SERVED
Naknek	AFTV King Salmon	City of Dillingham	Naknek
Iliamna	AFTV King Salmon	City of Dillingham	Dillingham (Intermediate)

[illegible]	[illegible]	[illegible]	[illegible]
Bellingham	KVOS King Snohomish	City of Bellingham	Bellingham
Bremerton	KVOS King Snohomish	State of Alaska	Bremerton
New Dungeness	KVOS King Snohomish	State of Alaska	New Dungeness
Lopez Island	KVOS King Snohomish	State of Alaska	Lopez Island
Blakely Island	KVOS King Snohomish	State of Alaska	Blakely Island
Mt. Hill	KVOS	State of Alaska	Shaktoolik
Sterling	KVOS	State of Alaska	Kwethluk
Clam Gulch	KVOS	State of Alaska	Clam Gulch
Sterling	KVOS	State of Alaska	Sterling
Soldotna	KVOS	State of Alaska	Soldotna
Mt. Vernon	KVOS	State of Alaska	Mt. Vernon
Kingscote	KSEA	Skyknight Sun	Kingscote
Cordwood	KSEA	Skyknight Sun	Cordwood
Cordwood	KSEA	Alaska Public Television	Cordwood
Palmer	KSEA	Skyknight Sun	Palmer
Sutton	KSEA	Skyknight Sun	Sutton
Sutton	KVOS	Northern Television	Sutton/Bilgola
Sutton	KIMA	Central Alaska	Sutton
Sutton	KSPS	Alaska Public Television	Sutton
Wildwood	KSEA	Skyknight Sun	Wildwood
Oregon Landing	KSEA	Skyknight Sun	Oregon Landing
Moose Pass	KSEA	Skyknight Sun	Seward/Moose Pass
Kenai	KSEA	Skyknight Sun	Kenai/Soldotna
Juneau Creek	KSEA	Skyknight Sun	Juneau Creek
Whittier	KSEA	Skyknight Sun	Whittier
Whittier	KIMA	Central Alaska Broadcasting	Whittier
Talkeetna	KVOS	Northern Television	Talkeetna
Mt. Vernon	KIMA	Central Alaska Broadcasting	Kenai/Soldotna
Hope	KSPS	Alaska Public Television	Hope
Hanly	KTNW	Skyknight Sun	Hanly

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

LOCATION	STATION CARRIED	LICENSEE	COMMUNITIES SERVED
Tuluksak	KYUK	Bethel Broadcasting	Tuluksak
Tuntutuliak	KYUK	Bethel Broadcasting	Tuntutuliak
Nightmute	KYUK	Bethel Broadcasting	Nightmute
Kipnuk	KYUK	Bethel Broadcasting	Kipnuk/Kwigillingok/Chefornak
Quinhagak	KYUK	Bethel Broadcasting	Quinhagak
Platinum	KYUK	Bethel Broadcasting	Platinum
Cape Newenham	KYUK	Bethel Broadcasting	Cape Newenham
Hill 351	KYUK	Bethel Broadcasting	(Intermediate)

CABLE TELEVISION

There are 15 commercial cable television systems in the state. In these systems, television signals are carried by cable directly to the consumer who pays a monthly charge for the service just as he would for any other utility service. Cable companies are regulated by the Alaska Public Utilities Commission.

The principal source of programming for cable systems in Alaska is off-the-air recording of commercial broadcast stations (usually in Seattle). These tapes are then distributed throughout the State by mail and freight. In places where broadcast signals are receivable, the cable company picks up these signals and distributes them via its system.

The commercial cable television companies in Alaska are listed below.

COMMUNITY	OWNER	SUBSCRIBERS	MONTHLY RATE
Barrow	Boling Enterprises, Inc.	300	$30.00
Cordova	Cordova Cable System, Inc.	618	$17.00
Haines	Lynn Canal Cable Vision	246	$19.00
Juneau	BC Cable Co. (JATV)	3,400	$18.00

COMMUNITY	OWNER	SUBSCRIBERS	MONTHLY RATE
Ketchikan	Ketchikan Television, Inc.	2,480	$15.00
Kodiak	KOTV, Inc.	1,800	$17.00
Kotzebue	Kotzebue TV	257	$25.00
Nome	Nome Cable TV, Inc.	550	$20.97
Petersburg	WPTV, Inc.	600	$20.00
Port Lions	Port Lions General Store, Inc.	55	$30 00
Sitka	Sitka Alaska Television, Inc.	1,494	$14.00
Skagway	Skagway Network Television	225	$17.00
Valdez	KCCS TV Cable, Inc.	1,252	$17.00 (est)
Wrangell	WPTV, Inc.	550	$20.00
	TOTAL	13,827	

Despite the many studies on television that the State has been subjected to over the past decade, until HCSSB 696 was passed, there had been no serious planning on a state-wide basis.

There have been many predictions of television by satellite for all Alaskans, but little had happened. The ATS-6 satellite experiments from September 1974 to June 1975 did demonstrate the value of the technique, and they raised expectations of those affected with regard to continuing services. Without a serious commitment to providing operational television services, however, it has seemed that studies alone were leading us nowhere, except possibly to more studies.

Some leaders in the State were aware that the technology to transmit television signals to the small earth stations was within reach; only limited further development would be needed. The problem seemed to lie more with poor utilization of the technology rather than lack of availability. Lack of utilization was, in part, caused by a disaggregated potential market. It appears that there is enough total demand for video distribution services to bring the cost down to affordable levels; but when individual requirements are small, costs will be high unless needs can be pooled. It now seems evident that some kind of push was needed, some means for making a distribution system available in order to determine how it would be, and should be, used.

SECTION III. SB 696 EVOLUTION

LEGISLATIVE COUNCIL SUBCOMMITTEE ON TELECOMMUNICATIONS MEETINGS

December 15, 1975 the Legislative Council Subcommittee on Telecommunications held an informal discussion of the questions involved regarding distribution of television programming in Alaska.

Representatives from commercial broadcast stations, cable stations, public broadcast stations, the Alaska Public Utilities Commission, the Alaska Education Broadcast Commission, the State Division of Communications, and the Governor's Office of Telecommunications were in attendance.

Professor Merrit, chairing the meeting for the Legislative Council, emphasized that with new technologies available and the rapid development of a satellite system for rural Alaska, people would soon want television. He also stated that a bill would probably be submitted this next (1976) legislative session for provision of television services, and the Subcommittee on Telecommunications needed input from broadcasters, etc. to determine what the scope of such legislation might be.

During the meeting, several significant points were made.

"Rural communities are more interested in entertainment than educational programs."

"Networks would not absorb any costs associated with distributing television."

"Several program copyright problems exist which would probably prohibit distribution via satellite."

"State should not get involved in television. Let free enterprise take over."

"Satellite television costs $1,000/hr or $800/hr on basis of 150 or more hours for single point delivery with $200/hr for each additional point."

"Bicycling video tapes to mini-transmitters or cable systems cheaper."

"Cost of various systems must be determined."

It was decided that a technical or ad hoc group should be formed to address problems associated with costs and programming. This group should report to the legislature before legislation is proposed to cover TV distribution.

February 6, 1976 the Legislative Council Subcommittee on Telecommunications with Representative Fred Brown, Chairman, hosted the Ad Hoc Committee meeting on the future of television in Alaska.

Attendance, typically, represented private industry and State agencies associated with or interested in television services.

Representative Brown called the meeting to order and gave a brief introduction as to the purpose of the Ad Hoc Committee and the status of legislation of certain bills and proposals having to do with telecommunications. He emphasized that the Legislature does not have any particular program in mind for television in Alaska, and that the Legislature was aware of the need and required input from the private and public sectors.

Mr. Hiebert, President of Northern Television, protested that the last meeting was too general and loose and that everyone was still asking the same questions. Either the Legislative Subcommittee or the Office of Telecommunications should come up with long-range needs of rural and urban areas and wants recommendations so others will know what the Legislature will do.

Representative Brown responded that the purpose of these meetings is to talk about these matters and not let the Legislature run off with its own ideas which might not be workable or desirable.

With that, the meeting got underway and significant points were as follows:

"RCA presented cost estimates to serve 100 villages with one channel television and operate tape delay center, $7.7 million."

"If network programs go to rural areas, urban affiliates would have to participate."

"Mini-transmitters and mail shipment of video tapes advocated as being cheapest method of distribution."

"Urban areas really don't expect live news!"

"Policy decision to be made as to whether the villages or State should pay for entertainment television."

"The state is already funding entertainment distribution through appropriations for translator systems."

"Government support should only be used to fill vacuum where private industry can't serve."

"Networks must be responsive to distribution by satellite. It would probably be an extension of affiliation with a licensed station."

"Talk has been about entertainment. Everyone is concerned about instruction and education for the bush. If we can't do something with video for the lifestyle or for the information or education of the people in the bush, we are going to miss the best bet we ever had!"

February 27, 1976 the Legislative Council Subcommittee on Telecommunications was called to order by the Chairman, Representative Fred Brown, who outlined a proposal which had passed the Senate asking that a portion, or all, of the $1.2 million remaining in the small earth station program be used for a pilot project to demonstrate what satellite television could be like in rural and urban areas.

Significant points of the meeting are as follows:

"Office of Telecommunications study, satellite vs. tape as means of distribution, satellite cheaper for over 40 stations with five hours per day programming."

"NBC programming may be received off the air at earth stations from affiliates. NBC agrees to provide feed to RCA TV center in L.A. at no charge. Distribution costs to be borne by broadcasters and appropriate agency of the State."

"Two television channels per one transponder might be possible with RCA F-2 satellite."

"Commercial programming on mini-transmitters owned and operated by the Public Broadcast System or Corporation for public broadcasting not allowed."

"Network programming couldn't go directly to a cable system."

"Has there been a study done on what villages want in the way of entertainment? Who will decide?"

"Possibility of a limited demonstration project having some merit. Chance to come up with answers before locked into a six or seven million dollar annual appropriation."

In early March 1976, Senator Ferguson sponsored a bill through the Senate Health Education and Social Services Committee (SB 696) appropriating $1.5 million to the Governor's Office of Telecommunications to provide a pilot satellite demonstration project for the State of Alaska.

In the intent it was stated that a satellite transponder should be leased for one full year providing one channel of television for selected villages and bringing live television to the urban areas. It further stated that village site selection should be made by the AFN Telecommunications Committee and that this Committee should also select programming in consultation with the Office of Telecommunications and the Alaska Educational Broadcast Commission. Commercial and public broadcast stations with access to a large earth station would have the opportunity to receive network programs via the State leased transponder.

March 26, 1976 another Select Committee on Telecommunications meeting with the Ad Hoc Committee on television. Representative Fred Brown chaired the meeting and reported on SB 696.

Significant points were as follows:

"Low cost way to get network feeds to Lower 48 earth stations would be from off the air pickups of local network station.

"Tape delay center operation would be most effective in Lower 48."

"What will happen to "free" program feeds after the one year demonstration project?"

"Technological development in itself will be of significant benefit."

"Programming cannot go directly from satellite to cable systems unless picked up from off the air of local station."

"RCA quotes transponder cost of $500,000 which includes terrestrial link to urban toll centers in Anchorage, Fairbanks, Juneau, Sitka and Ketchikan."

"State would not assume responsibility of providing local microwave link."

"AFN Committee passed resolution supporting TV Demonstration Project and accepted responsibility for rural site selection."

"Coordinated approach needed for programming discussions."

Senate Bill 696 was sent to the House for consideration and was amended to include:

$150,000 for the purpose of establishing a public radio network.

$100,000 for the purpose of providing television production costs for legislative coverage.

$75,000 to pay public broadcast station costs associated with receive only earth stations at Bethel, Anchorage and Fairbanks.

Opposition to the bill was forthcoming from the Alaska Broadcasters Association who felt that the government was infringing on areas reserved for private enterprise. Concern was expressed that the State was getting itself into a position to dictate programming; particularly in the rural areas and that the results could be disastrous. In essence, let things develop their natural way, the State should not get involved.

The amended bill passed both the House and Senate by wide margins and Governor Hammond was asked to veto the bill by those in opposition.

The Governor's concern revolved primarily around the potential ongoing revenue commitment that might be required on the part of the State. In allowing the bill to become law, Governor Hammond stated:

"The vote that SB 696 received in the Senate and the House shows strong support for improving television service in Alaska. I agree with the intent of this bill to provide timely programming for urban as well as rural areas of the State, not just for news, sports and entertainment, but also for instruction and social service. I am concerned, however, that we may be setting a precedent which will require continuing expenditures, increasing year after year.

This legislation purports to be a one year demonstration project, but it is hard to believe a total shutdown would be permitted after the year has passed. I don't think it is inappropriate for the State to assist in developing these services, but prefer that it act primarily as a catalyst, bowing out after a self-supporting operation is established. Regardless of how continuing operations are funded, I feel strongly that the end users--the viewers--must be aware of the true cost to them as taxpayers and have a voice in the decision-making process.

I am therefore instructing the Office of Telecommunications to explore reasonable means for funding television distribution for Alaska and to incorporate them with their recommendations for next year's legislature. If the alternatives can then be placed before the voters so they may be heard from, then I feel the public interest will be adequately protected."

SECTION IV. PROJECT DEVELOPMENT

DEVELOPMENT OF TECHNOLOGY

BUSH PARAMETERS:

The Office of Telecommunications had embarked on a

program to establish technical standards for use in transmitting television through the satellite system before HCSSB 696 became law. Theoretical calculations had shown that the small earth stations were just barely capable of receiving usable signals from the satellite, despite the fact that their sensitivity was only one-tenth that of the larger (10-meter antenna) stations that earlier standards had been developed for. By accepting slightly lower than standard picture quality and transmitting the audio signal through another satellite transponder, we were reasonably sure of success. Tentative standards were agreed upon during meetings with RCA Alascom and RCA Laboratories in February 1976. A number of receivers from different manufacturers had been tested at RCA Laboratories at this time, however, to fully simulate operational conditions tests were arranged using the satellite and an earth station at one of RCA Alascom's facilities in Anchorage. Receivers from eight manufacturers were evaluated during April and May 1976, supplying good data on competetive receiver designs as well as verifying the parameters selected for use with the small earth stations, now referred to as "bush parameters."

DUAL CHANNEL TRANSMISSION:

The ability to bring two channels of television through a single transponder has obvious appeal. Due to the low sensitivity of the small earth stations in rural areas, this is clearly precluded. Preliminary calculations indicated that this technique should be feasible for transmission into the larger earth stations (10 to 30 meter antennas) associated with the urban areas. Two channel capability plus the ability to access programming in either the Pacific or Eastern time zones gives us the potential to bring four national programs into Alaska that are scheduled for broadcast at the same local time.

Tests to evaluate dual-channel transmission were conducted at the RCA Americom earth station at Vernon Valley, N.J. in April 1976. They revealed serious crosstalk between the two channels when operating at power levels adequate to produce an otherwise quality TV picture after reception. This

crosstalk was severe enough that if program material was viewed on one channel while color bars or other highly saturated material was on the other channel the color was distorted in the desired channel to an objectionable degree; this was especially annoying since the two color sub-carriers would not be synchronous and would appear to "beat" with each other producing a visual moving hue shift.

A great deal was learned from the Vernon Valley tests, especially with regard to the necessity for the earth station itself to have its transmission apparatus in peak working order. A number of areas were identified for further exploration, both theoretical and experimental. Enough data was derived so that a more exhaustive test could be devised.

A second series of tests was scheduled at the RCA Americom South Mountain earth station outside L.A. for August 1976. Before the tests began, groups delay measurements of the earth station and satellite transponder were taken and equipment was obtained to equalize for this distortion.

The actual tests took place from 23 to 31 August. After initial equipment setup, transponder group delay equalization was successfully completed and testing proceeded. These tests resulted in definite tentative parameters for dual-channel transmission.

The crosstalk problem still persisted, however. Although the interference was not considered objectionable, to the casual viewer, it was noticeable and considered unacceptable in terms of broadcast quality standards. Shortly after the South Mountain tests, Dr. Guy Beakley of RCA Labs developed a signed processing circuit which eliminated the subjective effects of crosstalk to the observer. This was tested at the Laboratories in Princeton and then over a satellite circuit from South Mountain with satisfactory results.

TECHNICAL CHARACTERISTICS

BURST FORMAT - Transmission parameters for transmitting video and audio to the small earth stations are as follows:

LINK BUDGET BURST TV (TYPICAL)

EIRP SATELLITE	36.0	dBW
DOWN PATH LOSS (4 GHz)	-196.6	dB
LOSS O_2+H_2O	- 0.4	dB
SMALL EARTH STATION ANTENNA GAIN	43.9	dBi
SYSTEM TEMPERATURE (T^{20} EL)	- 24.0	dBK
BOLTZMANN'S CONSTANT	-(-)228.6	dBW/K-Hz
C/kT DOWN	87.4	dB-Hz
C/kT UP	104.5	dB-Hz
C/kT TOTAL	87.3	dB-Hz
RECEIVER THRESHOLD	85.5	dB-Hz
MARGIN ABOVE THRESHOLD	1.8	dB-Hz
MARGIN REQUIRED FOR 0.99 AVAILABILITY	1.2	dB
IMPLEMENTATION MARGIN	0.6	dB

[redacted] TV VIDEO

VIDEO DEVIATION	8.0	MHz
IF BANDWIDTH	20.0	MHz
VIDEO PRE-EMPHASIS	CCIR 405 (525/60)	
VIDEO BANDWIDTH	4.5	MHz
RATIO	[redacted] CHARACTER	
ENERGY DISPERSAL	5.0	MHz-PP
CARRIER OFF-SET FROM CENTER FREQUENCY	0	
TRANSPONDER BACK-OFF	0	
THRESHOLD C/NT	9.5	dB-Hz
VIDEO S/N CCIR# AT THRESHOLD	45.4	

LINK BUDGET - [redacted] CHARACTER AUDIO

SATELLITE EIRP	53.0	dB
DOWN PATH LOSS (TYPICAL)	-196.6	dB
LOSS O_2+H_2O	- 0.6	dB
RECEIVE ANTENNA GAIN	43.8	dBi
SYSTEM TEMPERATURE	- 24.0	dBK
BOLTZMANN'S CONSTANT	-(-)228.6	dBW/K-Hz
C/NT DOWN	63.0	dB-Hz
C/NT UP	71.6	dB-Hz
C/NT TOTAL	62.8	dB-Hz

[illegible]

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible] - Standard characteristics employed for single channel transmissions to large earth stations are listed on the following page.

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
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[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

DUAL CHANNEL FORMAT - The following parameters were developed for dual channel transmission to large earth stations.

LINK BUDGETS - DUAL CHANNEL TV

		DUAL CHANNEL PARAMETERS		
		BARTLETT	LENA POINT	
SATELLITE EIRP (SATURATION)		36.3	35.8	dBW
OUTPUT BACK-OFF PER CARRIER		-4.7	-4.7	dB
EIRP PER CARRIER		31.6	31.1	dBW
DOWN PATH LOSS (4 GHz)		-196.5	-196.4	dB
LOSS O_2-H_2O		- 0.4	- 0.4	dB
EARTH STATION G/T		39.5	29.9	dB/K
BOLTZMANN'S CONSTANT		-(-)228.6	-(-)228.6	dBW/K-Hz
C/kT DOWN		102.8	92.8	dB-Hz
C/kT UP (SATURATED)	104.5 dB-Hz			
INPUT BACK-OFF PER CARRIER	9.0 dB			
C/kT UP		95.5	95.5	dB-Hz
C/kT IM (26 dB C/IM in 17.5 MHz BW)		98.4	98.4	dB-Hz
C/kT TOTAL		93.2	90.2	dB-Hz
IF BANDWIDTH (17.5 MHz)		- 72.4	- 72.4	dB-Hz
C/N 17.5		20.8	17.8	dB
VIDEO SNR CCIRN		51.7	48.7	dB

DUAL CHANNEL VIDEO

VIDEO DEVIATION	6.7 MHz
IF BANDWIDTH	17.5 MHz
VIDEO PRE-EMPHASIS	CCIR 405 (VIDEO)
VIDEO BANDWIDTH	4.5 MHz
AUDIO	SEPARATE CARRIER
ENERGY DISPERSAL	0.5 MHz-PP
CARRIER OFF-SET FROM CENTER FREQUENCY	±9.5 MHz
TRANSPONDER BACK-OFF	6 dB Total
THRESHOLD C/kT	86 dB-Hz
VIDEO S/N_{CCIRW} AT THRESHOLD	44.5 b

RUSH RECEIVER CHARACTERISTICS

Receivers were ordered from three manufacturers after evaluations were completed. This was done to compare different approaches and obtain experience with different designs under field conditions, especially important for newly developed hardware. Characteristics are summarized on the following page.

SATELLITE TELEVISION RECEIVER CHARACTERISTICS

PARAMETER	HUGHES	MICRODYNE	SCIENTIFIC-ATLANTA
Detector Type	4 GHz Phase Locked Loop	Conventional Discriminator	Tracking Filter
Approximate Threshold C/kT	86 dB-Hz	86.5 dB-Hz	85 dB-Hz
IF Bandwidth	No IF	20 MHz	25 MHz
Tuning Range	Either of two selected channels between 3700 to 4200 MHz (4160 and 3920 MHz supplied)	24 transponder center frequencies, 3700 to 4200 MHz	2.5 MHz steps 3700 to 4200 MHz
Rack Space Used	3½"	5¼"	3½"

The following characteristics are common to all units:

NOMINAL CARRIER INPUT LEVEL	-80 dBW
NOISE FIGURE	12 dB
VIDEO OUTPUT LEVEL	1.0 V PP/75Ohms
VIDEO BANDWIDTH	4.5 MHz
DE-EMPHASIS	CCIR 405-1
POWER REQUIREMENTS	115 VAC 50 watts

MINI TV TRANSMITTERS

Two sources of 10 watt transmitters were selected for field evaluation. They are described below:

These units are complete ten watt television transmitters. They are small in size, about the dimensions of a 19" portable television set. They are designed to operate un-attended and have a minimum of operator controls. The coverage area depends on local terrain and will vary from one-half to two miles for rabbit-ear reception, adequate for all villages in the project and almost all others. The installation consists of a wall mounted shelf to hold the transmitter and a 30 foot guyed steel mast for the antenna.

SUPPLIERS:

1. ACRODYNE Industries
2. EMCEE, Inc.

PERFORMANCE CHARACTERISTICS:

Both vendors units meet broadcast performance requirements of the FCC rules with the exception of frequency tolerance which is better than required for translator service under which these transmitters are licensed.

ANTENNA SUPPLIER:

SCALA Radio Company, Type CA-4, 2 bay dipole reflector

PERFORMANCE CHARACTERISTICS:

Provides a varity of coverage patterns which can be tailored to site requirements.

RCA NEGOTIATIONS:

The early discussions with RCA Alascom focused on technical capabilities of existing facilities and negotiations for an agreement of terms and conditions to add television capabilities to the bush earth stations.

One thing that became painstakingly obvious as we initiated plans to implement the TVDP was the absence of existing communications facilities capable of providing the service into urban areas as envisioned in the legislative intent.

We were so caught up in the development of the satellite technology that we only superficially looked at methods to provide signals from the earth station, once they were received, to the urban toll centers. We banked too heavily on assumptions that the television receive earth station would be completed in Fairbanks and the comprehensive earth station would be completed at Eagle River.

In the Lower 48 we pretty much left it up to RCA to determine how they would get signals from the urban areas to the earth stations and to define what the costs of providing such service might be. There was a definite desire to get line feeds (direct connects) from the networks, in lieu of picking signals up off the air from local television stations to obtain better quality.

Scheduled installation of the television receive only station in Fairbanks and the Eagle River earth station near Anchorage was slipping beyond estimated startup date of the Television Demonstration Project. It appeared that with this slippage service could not be provided as originally envisioned.

In mid August, the Office of Telecommunications in a letter to Alascom indicated the tasks and actions necessary to implement the Demonstration Project.

Technical requirements by community were stated as well as the dual channel capabilities for urban areas. Alascom was asked to provide cost information and estimated dates of when service could be provided.

On September 14, Alascom responded to the Office of Telecommunications that:

"As a result of the joint tests between RCA Alascom and RCA Americom in which representatives of your office participated, we have concluded that two channel video per transponder is not currently an acceptable transmission technique. Further, in our Cost Analysis of the alternatives, we have determined that while two channels per transponder transmission would ease scheduling difficulties, it would result in a somewhat higher yearly cost to the State, over single channel per transponder transmission. We have prepared two proposals for facilities to transmit television programming:

RCA Alascom will therefore provide facilities to permit transmission of one channel video per transponder, with separate audio from South Mountain L.A. for delivery to RCA Toll Centers in Anchorage, Fairbanks, Juneau, Sitka and Bethel, and selected bush locations. In addition to the interstate transmission capability, facilities would be made available for single channel separate audio transmission from Anchorage and Juneau. Twenty-three of the twenty-four proposed bush locations (excluding Little Diomede) would be equipped to receive television programming at a cost of $631,000. This figure represents the total RCA cost for integration equipment, installation and testing of all bush locations. The exact activities involved are outlined in the attached Statement of Work. Due to the fact that this is a one year demonstration program, we propose the State pay this amount as a single non-recurring charge.

The space segment and other associated ground station costs for the program would be recovered through an hourly fee for program transmission of $221. A contract for a minimum of 6,000 video transmission hours will be prepared for the State's approval. This rate includes operation and maintenance of both urban and bush locations. The situa-

tion at South Mountain, concerning microwave delivery of programming, has yet to be resolved. We propose that charges developed for this service be handled on a direct pass through basis to the State.

SUMMARY

6000 hours at $221	$1,326,000.00
Bush Installation	631,000.00
Total	$1,957,000.00

"The annual charges for the above program exceed the $1.5 million appropriated by the Legislature. In an effort to seek an alternative program, which would meet the intent of the bill, at a reduced rate, we have prepared the following proposal:

RCA will make facilities available to permit the transmission of one channel separate audio video programming from Anchorage to be received at the 23 bush locations. The rate for this service would be $375 per program hour transmitted with a minimum contract of 25 hours transmission per week, or 1300 hours per year. Again, this rate includes operation and maintenance of both bush and urban location.

We would look to the State to recover RCA's cost of $631,000 for installation of the 23 bush locations.

SUMMARY

1300 hours at $375	$ 487,500.00
Bush Installation	631,000.00
Total	$1,118,500.00

The RCA proposal to the State was deemed unacceptable and contract negotiations began.

RCA ALASCOM/STATE CONTRACT:

On October 14, 1976, after several weeks of negotiations, a memorandum agreement was signed by the State and RCA Alascom in the amount of $925,000.

This agreement was for the purpose of providing television service to various bush locations including service to Anchorage, Fairbanks, Juneau, Sitka and Bethel.

Although the agreement encompassed only the delivery of intrastate television service it was felt that some type of agreement was necessary to get the project off the ground.

Reaction to the agreement was quick in coming. The Legislative Council and the commercial broadcasters pointed out that the agreement for services did not comply with legislative intent as there was no provision for interstate service.

The Office of Telecommunications explained that negotiations for interstate service were still underway and that progress was being made. Dual channel service was still the major obstacle. By signing the initial agreement for intrastate service, applications to the Federal Communications Commission for construction of television capabilities at the small earth stations could be accomplished. OT recognized that the agreement did not encompass the legislative intent and was working towards finalizing a new agreement.

On December 21, 1976, a contract for services was signed by the State of Alaska and RCA Alaska Communications. This contract superseded the memorandum of agreement dated October 24, 1976 and provided for distribution of both interstate and intrastate television to 23 bush communities and five urban locations in the State of Alaska. This contract is included in the appendix for reference.

Dual channel television capabilities was to be provided from the RCA South Mountain earth station near L.A. to Anchorage, Fairbanks and Juneau.

This contract, prior to signing, was reviewed by the Attorney General's office and the Legislative Council's consultants on telecommunications and deemed acceptable and in compliance with legislative intent.

Estimated startup date for the television demonstration project was to be January 15, 1977, and under the terms and

conditions of the contract, service would be provided for one full year until January 15, 1978.

COMMERCIAL BROADCASTERS:

After the passage of HCSSB 696, meetings with the Television Advisory Committee continued with emphasis being placed on system configuration and programming for both the urban and rural areas.

The broadcasters were kept up-to-date on negotiations with RCA [illegible] and provided invaluable assistance in working out deta[illegible] providing entertainment programming [illegible] rural villages.

OT continuously emphasized that although it was in the role of project director it was acting only as a coordinator for program requirements. In distributing or providing programs OT would assure compliance with both copyright and FCC laws and regulations. The broadcasters were then asked to define the scope in which they felt they could cooperate.

At the June 30 meeting of the Television Advisory Committee several ideas and system concepts came forth:

"Separate the urban and bush programming issues."

"Identify the amount of programming desires and see what system configuration can best suit requests."

"Alaskan network affiliates can get any network programming they want for urban areas."

"General agreement among broadcasters that they desired access to time value programs such as news, sports and other special events."

"Concern by broadcasters of public attitude if at end of year's Demonstration Project television services are cut off."

"Broadcasting of commercial programming in the bush might be possible if community mini-transmitters are licensed as translators of Anchorage stations."

At the conclusion of the meeting it was decided that the network affiliates would prepare a list of program requests and that meetings with the networks in New York should be scheduled to clarify any legal implications.

At the next Television Advisory Committee meeting on July 21, 1976, most of the discussion centered around operational issues.

Bob Walp, Director of OT, reported on meetings with the networks in essence summarizing meetings by saying if agreements are satisfactory to Alaskan affiliates, networks would probably cooperate consistent with copyright and FCC laws and regulations.

To gain the most flexibility in delivering programs via one transponder it was suggested that television feeds from both east and west coast earth stations be made available. Looking at network schedules on both the east and west coast it was felt that there was no need for a delay center in the lower 48 for programming into urban areas. Any delaying that had to be done could be handled by the local station by tape recording the incoming network feed.

The Television Advisory Committee met again on August 11, 1976. The Office of Telecommunications had prepared a schedule based on the broadcasters' request for programming and it looked like most requests could be filled using network feeds from both east and west coast time zones.

General discussion of approach to be taken if conflicts occurred in schedule and most agreed difficulties could be worked out.

There was concern by the broadcasters of RCA Alascom's capability to deliver two simultaneous video channels to Anchorage and Fairbanks. Representatives from Alascom indicated that the Fairbanks television receive only earth station should be completed the last quarter of 1976 making two channel delivery possible.

It was agreed that a delay center operated in Anchorage might be the best approach in serving the bush and that the

broadcasters could probably record tapes and provide them to the delay center for broadcast.

At the Television Advisory Committee meeting on November 17, 1976, the broadcasters expressed concern regarding the October 14, 1976, memorandum agreement between the State and RCA Alascom. Broadcasters were particularly concerned that the agreement did not speak to the provisions of interstate television services. It was explained that agreement for interstate service was dependent on RCA price figures and technical capabilities that had not been obtained. Negotiations with RCA were currently underway.

OT explained that it had contracted the Alaska Public Broadcast Commission to operate a delay center for originating bush programs. It was decided to form a team to identify program sources and determine a mechanism for broadcasting network programs to the bush.

General discussion of possible system configurations for interstate services to meet broadcasters' request for programming with consensus once again being that transmit capabilities from both east and west coast network feeds would be necessary. It was decided to form a technical committee to work on the various system alternatives.

Since the November 17 meeting there have been no formal meetings of the Television Advisory Committee. Contact and planning have been maintained through the formation of a technical working group and a programming committee.

In early January, Mr. Augie Hiebert, representing the Anchorage broadcast stations, and George Shaginaw of OT met with the commercial networks in New York City to finalize agreement for commercial entertainment programming to both the urban and bush communities participating in the demonstration project. These meeting were successful and enabled programming to start on schedule, January 15, 1977.

RURAL SITE SELECTION AND PROGRAMMING:

The Alaska Federation of Natives Telecommunications Committee, established during the AFN Inc. general convention on

October 23, 1975, had been acting as a channel of communications between rural communities, the telecommunications network, the Office of Telecommunications and the State Legislature under the legislative intent of HCSSB 696.

The Committee, comprised of representatives from each of the 12 regional nonprofit corporations, had the responsibility for site selection and programming for the demonstration project.

The selection of the villages that were to participate in the project was determined by developing the following criteria:

1. Villages will have earth stations (excluding ATS-6 earth stations and bicycling tapes).
2. Two villages from each region, since Cook Inlet did not have earth stations and North Pacific Rim and the Copper River Region only had one, this number was divided up among the larger regions;
3. Villages will have sufficient electrical power to absorb the added usage;
4. In regions where there were more than two earth stations, villages having a secondary school were given priority over those having primary schools.

Once the criteria was established, the Committee selected the following sites:

ARCTIC	CALISTA
St. Paul	Kipnuk
King Cove	Nakoryuk
	Emmonak
SOUTHEAST	KODIAK
Cape Pole	Larsen Bay
Tenakee Springs	Old Harbor
NORTH PACIFIC RIM	COOK INLET NATIVE ASSOCIATION
Tatitlek	None

[redacted]

Rosetab
Ohungnab
[redacted]

[redacted]

Gamhell
Gamsonga

[redacted]

Pudet Bays
[redacted]

[redacted]

Chidlow

[redacted]

Pilot Point
Perryville

[redacted]

Holy Cross
Stageviab

The National TV Guide, Gambit, a magazine listing Public Service Programs, and a fifteen page booklet listing all of the available programs from the four major networks, along with a brief synopsis was given to the APB Committee to assist them in their selection of programs. A list of alternate sources of programming was also prepared by the Office of Telecommunications because a great deal of the Committee's time was involved in discussing whether or not there was sufficient programs produced in Alaska or by the Canadian Broadcasters that would be relevant to rural Alaska. A few guests at Committee hearings voiced their opinion that commercial television with its violence and sexism would be harmful to bush villages and that programs depicting village or family life styles would not be harmful but would increase the villages's awareness of himself and his environment.

The APB Committee, in making their program selections, was acutely aware of the vast cultural and educational differences in their regions and of the harmful effects that commercial television could have. They were also aware of the fact that they had complete control over what types of programs that would be televised to rural Alaska. Taking all these factors into consideration, the APB Committee developed seven major categories to assist them in their program selections:

1. Sports
2. News
3. Movies
4. Children's Programs
5. Young Adult
6. General Entertainment
7. Educational

Using the materials that were prepared for them, and having a general knowledge of available programs, the MPI Committee then selected programs in each category. The Office of Telecommunications then filled these shoes into a weekly schedule that would conform with their television time.

[redacted]

Formal offers to participate in the project were made by the Office of Telecommunications to several State and federal agencies involved in areas of education and health care delivery. Letters and phone calls of interest were received from all groups who had been contacted.

The Department of Education's decision to participate was communicated in Commissioner Lind's letter of December 30, 1974.

"I am encouraged to learn that the State-leased communications is being made available for educational use, in and out of the classroom. This project, particularly if it is to continue, allows us a good opportunity to develop realistic and relevant instructional television to improve and expand educational opportunities for all Alaskan students. This 'field test' has implications for increasing media awareness for educators and students alike, with or without access to satellite delivery. It is an opportunity the Department is pleased to accept."

The TV demonstrations also allows for the opportunity of expanding on the HEW-6 satellite experiment (ATS-6). HEW-6 had concentrated on the process of involving parents and educators in the design of instruction, Alaskan-produced programs, and two-way audio interaction.

Based on these learning experiences, HEW's utilization of the satellite for instructional programming provided to allow decision-making from participating school districts. HEW pursued this course consistently to gain maximum evidence for the process of media selection and utilization by individual schools and districts. While the

focus has been on the specifics of this demonstration, the process itself holds valuable lessons for ITV delivery by all means of technical delivery currently available Statewide.

Selection of programming followed clearly outlined steps to maximize educators' involvement.

1. All districts with satellite-receiving site schools were notified about the project in November, 1976. Participation was optional.

   An outline of potential instructional courses was provided, as well as local costs in terms of equipment, staff time and potential training required, and the unknown future of the project. All districts chose to participate, identifying key curriculum areas of need.

2. A planning workshop was held, attended by representatives from each district. Programs were previewed and evaluated, based on their appropriateness to local curriculum, cultural bias, format, subject, and suitability of accompanying teachers' manuals.

3. Based on teacher and district evaluations of programs, the broadcast schedule was completed.

4. Information about the project was mailed to all schools, along with teachers' manuals, and a log for reporting utilization of each broadcast.

5. Evaluation planning includes on-site visits; teacher, student and parent questionnaires; in-depth personal interviews at five schools, in conjunction with CNER's extensive study of the impact of satellite television in the villages; and consistently solicited comments, suggestions and reactions by any and all teaching staff.

User defined needs have given priority to in-service training and certification renewal credit courses for teachers and instructional programming in a wide variety of areas.

Due to the Office of Telecommunications limited staff it was hoped that the State and private colleges and universities would develop some type of coordinating relationship so they could possibly request a block of time and schedule it themselves.

The concept of attempting to have the groups with similar fields of service to voluntarily coordinate with each other has not worked as was originally conceived. This can be attributed both to the short time span available for gearing up to transmit materials and the fact that the coordination can be done very informally.

However, there was considerable discussion between the Office of Telecommunications and individual representatives of universities and colleges regarding time availability, programming, system technical capabilities and project starting dates.

The University of Alaska's School of Engineering made the decision to experiment with a computer programming course that will be aired live. The production costs are minimal because they are using a lecture format. The course scheduled to be transmitted live from downtown Juneau was designed to be delivered to classroom students at both the Anchorage and Fairbanks campus and delivered via the local cable system in the Juneau area.

The Dean of the School of Engineering anticipates teaching two additional courses via the State-leased system to test the feasibility of providing engineering courses by television verses flying professors to the individual communities.

Sheldon Jackson College in Sitka made the decision to rent two courses, Introduction to Business Administration and Introduction to Psychology from a school in California, transmit

them over the satellite and give credit to students who enroll and pay tuition. This should be a test of pre-produced material designed for the lower 48 and broadcast to villages where there may or may not be clientel.

SECTION V. SYSTEM DESCRIPTION

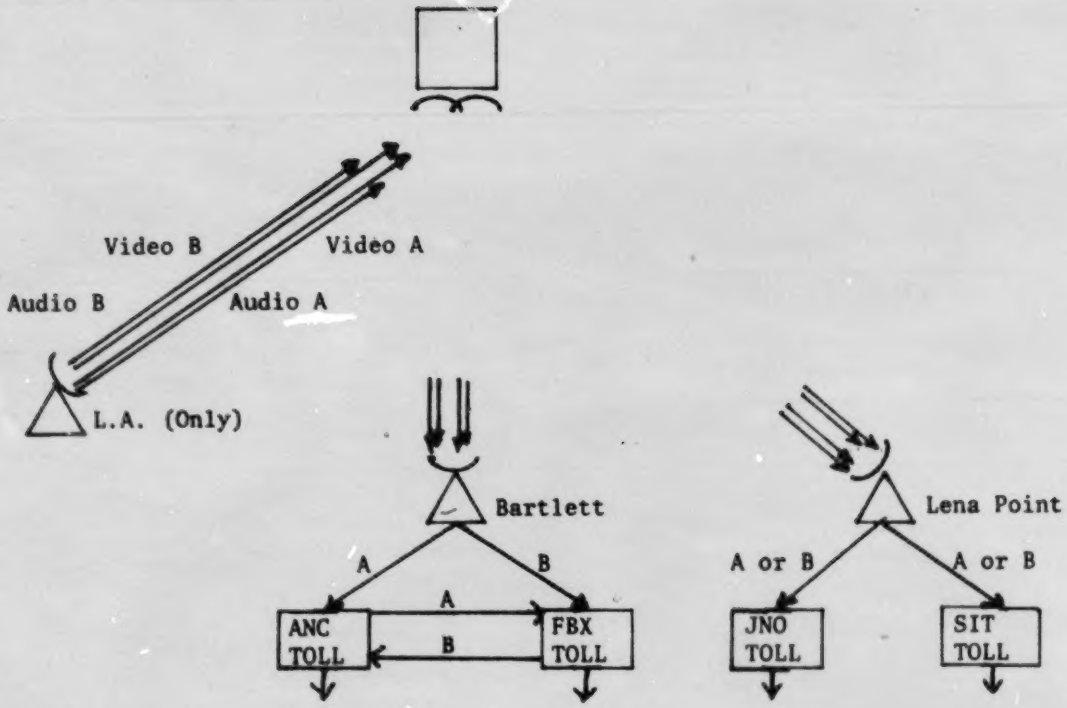
This section describes the facilities employed in the Television Demonstration Project at this time. First, the network to import signals from the lower 48 and to distribute them within the State is described; a second sub-section lists the pertinent technical parameters which are unique to this report. Finally, is a listing of the technical evaluation which should be accomplished during the TVDP.

SYSTEM CONFIGURATION AND OPERATION:

Television programming is transmitted to Alaska from the RCA earth stations at either South Mountain, near Los Angeles, or Valley Forge, Pa. These earth stations use off-the-air reception to pick up the programming for transmission to the satellite, i.e. the television signals are received from the local broadcast stations within range of the earth stations. Several modes of transmission are possible, as follows:

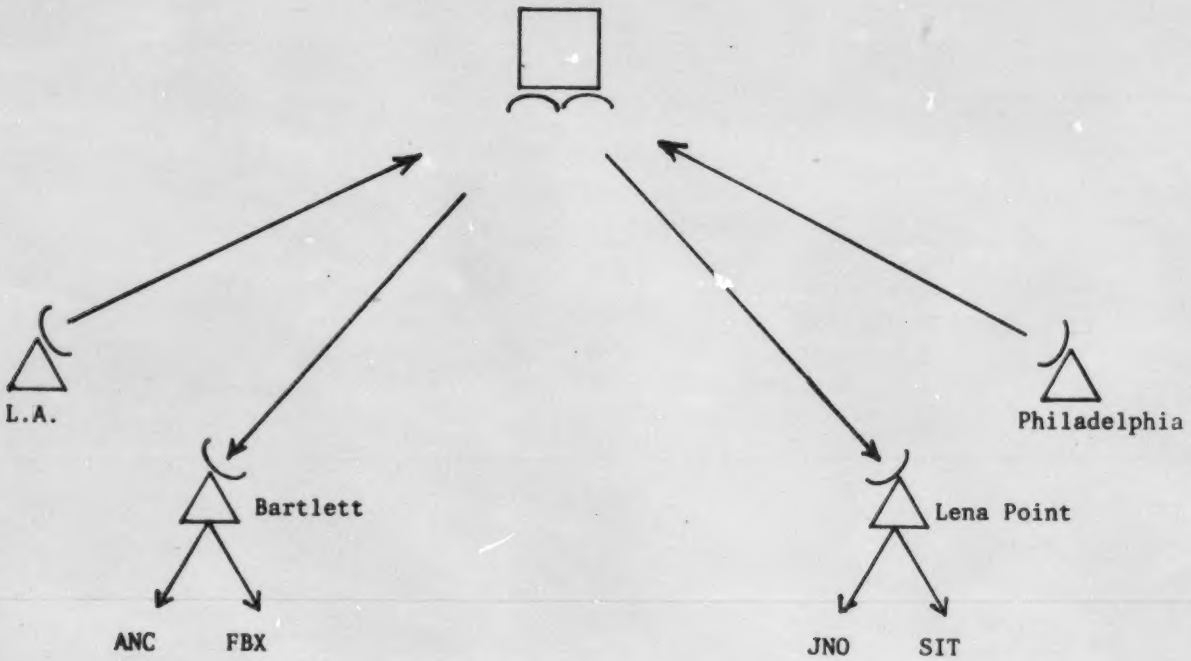
1. Dual channel transmission to large earth station in Alaska for use by the urban broadcast stations. Only South Mountain is equipped to do this currently; additional funds are needed to provide for this service from Valley Forge. Programming received in this manner would be recorded by the stations to be broadcast locally at an appropriate time or broadcast live.

(Dual channel video delivery illustrated on following page.)



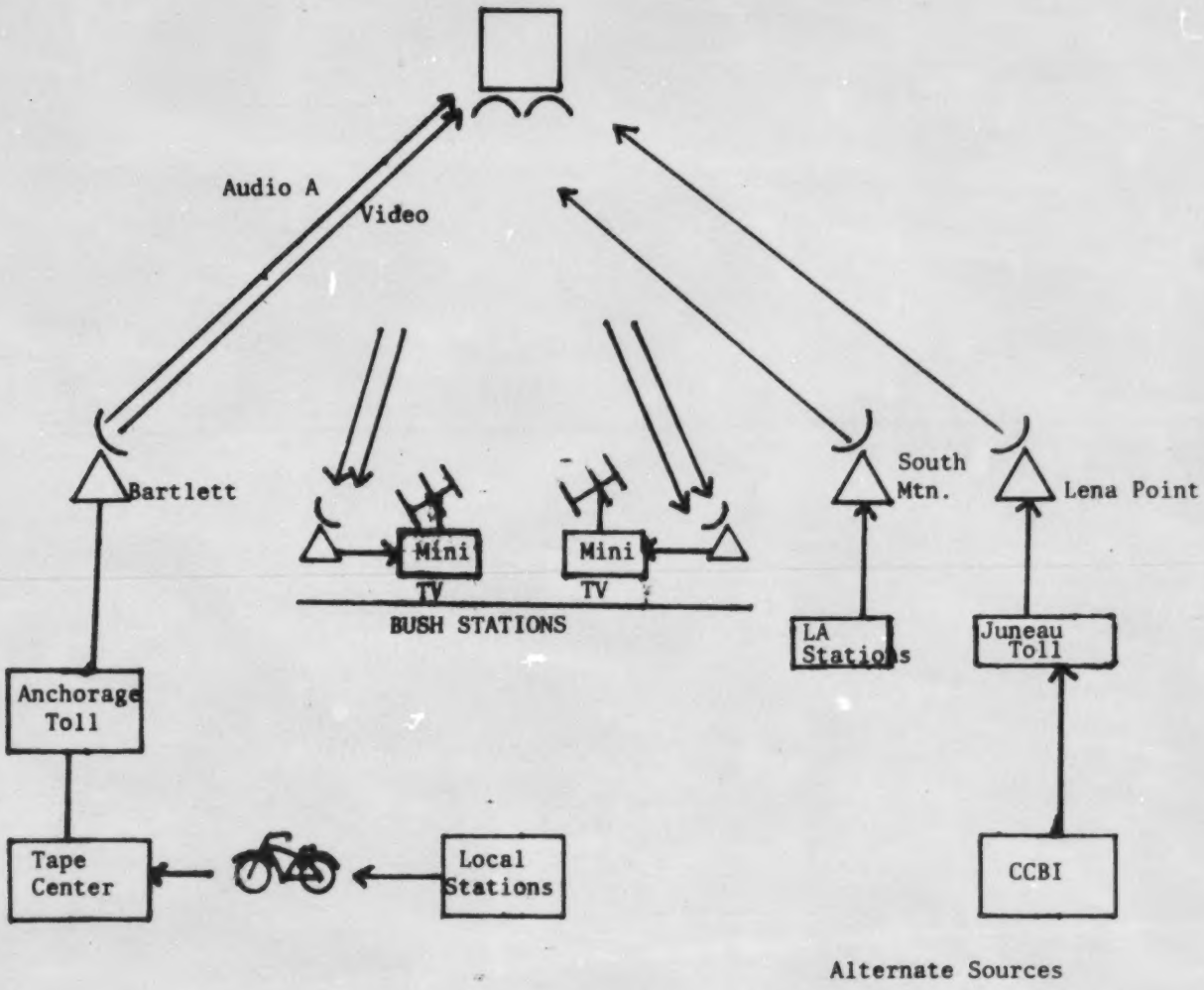
DUAL CHANNEL VIDEO DELIVERY
(2 video channels in one transponder;
audio on 2 separate channels in
another transponder.)

2. Single channel transmission in conventional format to the large earth stations. This mode can be utilized at South Mountain and Valley Forge. It utilizes standard technical parameters and is not intended to be picked up on bush receivers. As above, these signals would be used for local broadcast, generally with tape delay.



Television Delivery
Standard Format
(Video and Audio Combined)
Receivable at Major Stations Only

3. Single channel transmission in bush format. This uses the technical standards developed for use with the small earth stations. This mode of transmission can be accomplished at both earth stations in the lower 48 and is used only for special programming that is to be shown in the bush communities at the same time it is in the lower 48. (These signals can also be received by the large earth stations and are therefore available in urban areas at the same time.)



BUSH TELEVISION DELIVERY
(Separate Video and Audio)

The bush stations receive programming which must always be transmitted via the satellite in the bush format from the following locations:

ANCHORAGE--The programming is originated from a tape delay center operated by the APBC. Tapes are generally obtained from the local stations whether recorded from satellite or from video tapes that have been shipped in. Signals from the delay center are microwaved to the RCA Toll Center in Anchorage and then by microwave link to the Bartlett earth station for transmission to the satellite.

JUNEAU--Programming can be transmitted from Juneau via a microwave link through the Lena Point earth station to the satellite. Currently the Capital 77 program and University and DOE programming are using this source.

SOUTH MOUNTAIN OR VALLEY FORGE--This is the same process listed as Item 3 above as it represents the direct importation of signals from the lower 48.

The broadcast stations in Anchorage and Fairbanks receive their signals from the Bartlett earth station at Talkeetna through microwave links to those cities. Bethel gets its programming from the Bethel earth station. Juneau and Sitka receive signals from the Lena Point earth station via microwave circuits.

Broadcast of programming in urban areas is done through the existing television stations, four in Anchorage, three in Fairbanks, and one each in Bethel, Juneau, and Sitka. Satellite delivered programming is generally tape delayed, but may be transmitted straight through for special situations. Most programming for these stations is derived from tapes which are mailed in, or produced locally, as it was before the TVDP was started. Only the more timely shows are brought in by satellite.

The following chart summarizes the various modes of operation:

	South Mountain	Valley Forge	Anchorage	Bethel	Fairbanks	Juneau	Sitka	Bush Stations
ORIGINATE 1 BUSH CHANNEL	X		X			X		
ORIGINATE 1 STANDARD CHANNEL	X	X	X			X		
ORIGINATE 2 CHANNELS	X							
RECEIVE 1 BUSH CHANNEL			X	X	X	X	X	X
RECEIVE 1 STANDARD CHANNEL			X	X	X	X	X	
RECEIVE 1 OF 2 CHANNELS			X	X	X	X	X	
RECEIVE 2 CHANNELS			X		X			

Broadcast within the bush communities is accomplished by means of 10-watt "mini-TV" transmitters. These transmitters have a range of several miles and are ideally suited for village use.

TECHNICAL EVALUATION:

To effectively evaluate the technical aspects of the Television Demonstration Project, several areas need to be investigated. These fall into the broad categories of:

1. Performance of existing equipment in the bush
2. Refined data on satellite, earth station and propagation characteristics
3. Evaluation of new equipment in the market place
4. Re-evaluation of design assumptions and transmission parameters adopted

The satellite coverage of Alaska is not known precisely. The data we have is plotted from satellite characteristics measured prior to launch, and while this may be adequate for

designing small systems which employ large operating margins, a more refined set of characteristics is essential to designing large systems where small errors are multiplied and can become expensive. To obtain this data the following is recommended:

1. Measure carrier to noise density at several small earth stations selected on a geographic basis. This would give sound information for future system design. This process should be repeated several times during the period of the Demonstration Project to give data on changes which occur with time and season and to average out inevitable small errors in measurement.

2. Record signal strength received at representative earth stations on a continuous basis over a period of several months. This would yield information about signal fading and is needed to more accurately predict the system margins required. The amount of margin chosen has a greater effect on the cost and reliability of future systems. Little data exists on signal fading when operating at the low antenna look angles common in Alaska.

This data will assist in future message telephone system design as well as for television.

The performance of equipment installed in the bush earth stations for the Demonstration Project must be assessed to give insight for future purchases. The following areas should be considered:

1. Reliability. Failures should be classified and analyzed to produce recommendations for changes in specifications needed in future.

2. Performance degradation that occurs with time. The equipment performance should be re-measured near the end of the project to document any change in characteristics.

This is particularly important in the area of receiver threshold as any deterioration in threshold affects future system designs.

3. Evaluate vendor service on defective equipment.

The market for television receivers of the type purchased for use in the Demonstration Project is not yet mature. Many new manufacturers of receivers have entered the market place since we tested units in April and May of 1976, encouraged as they were by an FCC decision to allow the use of 4.5 meter antennas as receive only stations serving cable systems in the lower 48 and by the prospect of a large Alaska market. The performance of this new equipment, and that of improved models of previously tested receivers, should all be evaluated to give an accurate picture of the current market. This is especially important as available receiver threshold performance greatly affects system design.

Finally, the parameters adopted for bush television transmission should be re-evaluated in light of the information gained from the above investigations. There are alternatives with regard to the bush transmission parameters such as:

1. The established standards could be reaffirmed and could be retained as they are.

2. These standards could be modified to the degree warranted by information gathered about receiver performance, satellite signal strength, signal fading and operational requirements. Changes could be made in the method of carrying the program sound, the amount of video deviation, the video signal could be clamped before modulation, and adjustment of the receiver IF bandwidth may be necessary.

The transmission of dual channel television is a new technique and further refinement is possible and should be accomplished to raise the performance of this service to the level normally associated with broadcast television. Several changes could be made in the present dual channel standards,

some of the more important of these are:

1. If testing confirmed the practicality of doing so, the program sound could be carried on a subcarrier in the same manner that it is in the standard format. This would reduce the amount of equipment required at transmitting and receiving earth stations and reduce satellite useage by eliminating the sound carriers in the bush transponders.

2. The use of clamped video modulation may allow increased video deviation and thus improved video signal-to-noise ratio. Equipment to test this will be available in the next six months.

3. Video noise reduction equipment is becoming available and should be tested to determine its effectiveness with respect to cost.

The present method of transmitting dual channel television is not the only one possible. We are using frequency modulation because it is widely used and is relatively inexpensive to implement. Digital television techniques are being developed at several companies which will make possible the transmission of up to three broadcast quality video signals through one transponder. The equipment is currently very expensive but the cost should decline in the next few years to the point that the investment in hardware at the small number of large earth stations involved may be easily justified by a large reduction in space segment costs. We should closely monitor the development of digital TV equipment and participate much as we have in the development of the present dual channel technique to help assure that suitable equipment becomes available and that we are knowledgeable of the market.

SECTION VI. SYSTEM UTILIZATION

The Office of Telecommunication's commitment in coordinating the Television Demonstration Project is based on the legislative intent of HCSSB 696: to provide overall management made by users. This management process is designed to allow the widest possible range of users to participate with a wide variety of television programming and content to a wide cross section of the Alaskan public, both urban and rural.

As we enter the second full month of operation of the project, the following organizations and agencies are currently participating in the total 122 hours of programming per week:

URBAN COMMERCIAL:

Anchorage	KENI-TV	NBC
	KIMO-TV	ABC
	KTVA-TV	CBS
Fairbanks	KFAR-TV	NBC/ABC
	KTVF-TV	CBS/ABC
Juneau	KINY-TV	NBC/ABC
Sitka	KIFW-TV	CBS/ABC

URBAN PUBLIC BROCST.

Anchorage	KAKM-TV	PBS
Fairbanks	KUAC-TV	PBS

EDUCATIONAL:

Campuses in Anchorage, Juneau, Fairbanks	University of Alaska/SS
21 villages	University of Alaska/SS
19 rural village schools	Department of Education
21 villages	Adult Basic Education/DOE
21 villages	Sheldon Jackson/Sitka
21 villages	Dept. of Health & Social Services

A general breakdown of programming can show the following utilization:

[redacted]:

Entertainment	14:15 hours per week
Public Affairs	08:15 hours per week

[redacted]:

Entertainment	30:30 hours per week
Public Affairs	15:30 hours per week

[redacted]:

	15:30 hours per week
TOTAL HOURS PER WEEK:	110:00

The weekly broadcast schedule for all urban, rural and educational broadcasts is on the following two pages.

[illegible]

[illegible]

[illegible]

Thursday

EDUCATIONAL PROGRAMMING

8:00/ 9:30A		University of Alaska
10:00/10:30A		Infinity Factory
10:00/10:30A		Inside/Out - Health Ed./9-10
11:00/11:30A		*Introduction to Business Admin. (100 level credit college course)
11:30/12:00N		*Introduction to Psychology (100 level credit college course)
12:30/ 1:00P		***Health Films (General)
1:00/ 1:15P		Instructional Program

URBAN PROGRAMMING

2:00/ 3:00A	CBS	News
5:00/ 7:00A	ABC	AM America
5:00/ 7:00A	NBC	Today Show
1:30/ 2:00P	ABC	News
2:00/ 2:30P	PBS	Black Perspective on News
2:25/ 3:55P	APBC	Capital 77
4:00/ 4:30P	CBS	News
4:25/ 4:55P	CCBI	Joe LaRocca
5:00/ 5:30P	NBC	News

RURAL PROGRAMMING

5:00/ 5:30P	NBC	News
5:30/ 6:00P	APBC	Capital 77
6:00/ 6:30P	CBS	Wild Kingdom
6:30/ 7:00P	PBS	Once Upon a Classic
7:00/ 7:30P	ABC	Barney Miller
7:30/ 8:30P	NBC	Tales of the Unexpected
8:30/ 9:30P	CBS	The Walton's
9:30/10:00P	NBC	Sanford & Son
10:00/11:00P	CBS	Hawaii 5-0
11:00/11:30P	APBC	Capital 77
11:30/12:00M	CBS	News

Friday

EDUCATIONAL PROGRAMMING

10:00/11:00A	Sesame Street
11:00/11:30A	Right On! - Health Ed./Elem.
11:35/11:45A	Inside/Out - Health Ed./9-10
11:45/12:00N	Instructional Program
12:00/12:30P	**Basic Skills (GED Preperation)

URBAN PROGRAMMING

2:00/ 3:00A	CBS	News
5:00/ 7:00A	ABC	AM America
5:00/ 7:00A	NBC	Today Show
1:30/ 2:00P	ABC	News
2:00/ 2:30P	PBS	McNeil/Lehrer Report
2:55/ 3:25P	APBC	Legislative Summary
3:25/ 3:55P	APBC	Capital 77
4:00/ 4:30P	CBS	News
4:25/ 4:55P	CCBI	Joe LaRocca
5:00/ 5:30P	NBC	News

RURAL PROGRAMMING

5:00/ 5:30P	NBC	Nightly News (live)
5:30/ 6:00P	APBC	Capital 77
6:00/ 7:00P	CBS	Children's Film Festival
7:00/ 8:00P	ABC	Donny and Marie
8:00/ 9:00P	ABC	Charlie's Angels
9:00/10:00P	ABC	Bionic Woman
10:00/11:00P	CBS	Hee Haw
11:00/11:30P	APBC	Capital 77
11:30/12:00M	CBS	News

Saturday

EDUCATIONAL PROGRAMMING

7:00/ 8:00A	*Introduction to Business Admin. (Repeat of Tuesday & Thursday)
8:00/ 9:00A	*Introduction to Psychology (Repeat of Tuesday & Thursday)

URBAN PROGRAMMING

8:30/11:30A	CBS	Tennis Championships
11:30/ 1:00P	CBS	Sports Spectacular
1:45/ 3:00P	ABC	Pro Bowl
2:00/ 4:00P	NBC	NCAA Pac 8
3:00/ 4:00P	ABC	Wide World of Sports
4:00/ 4:30P	NBC	News
4:30/ 5:00P	ABC	News
4:30/ 5:00P	CBS	News

RURAL PROGRAMMING

5:00/ 6:00P	ABC	American Bandstand
6:00/ 6:30P	NBC	Saturday News
6:30/ 7:00P	APBC	Legislative Weekly Summary
7:00/ 8:00P	NBC	Little House on the Prairie
8:00/ 9:00P	NBC	Fantastic Journey
9:00/11:00P	NBC	Saturday Night at the Movies

Sunday

URBAN PROGRAMMING

6:30/ 7:30A	CBS	Face the Nation
7:30/ 8:00A	NBC	Meet the Press
8:00/10:00A	NBC	Grandstand NCAA
11:00/11:45A	CBS	Challenge of the Sexes
11:45/ 3:00P	CBS	NBC Basketball
12:30/ 1:30P	ABC	Boxing Championships
1:30/ 3:00P	ABC	Wide World of Sports
3:30/ 3:00P	PBS	World Press
3:30/ 4:00P	NBC	News
4:00/ 4:30P	CBS	News
5:00/ 6:00P	CBS	60 Minutes

RURAL PROGRAMMING

5:00/ 6:00P	CBS	60 Minutes (live)
6:00/ 7:00P	CBS	Bugs Bunny/Road Runner Hour
7:00/ 7:30P	CBS	Big Blue Marble
7:30/ 8:30P	NBC	Wonderful World of Walt Disney
8:30/ 9:30P	CBS	Code R
9:30/11:00P	ABC	Wide World of Sports

All programming was selected by users, not OT management. Each participating organization, upon acceptance of available time, made independent programming decisions and time schedule selections.

URBAN, COMMERCIAL AND PUBLIC BROADCAST:

Network affiliates in Anchorage, Bethel, Sitka, Juneau and Fairbanks selected their priorities for entertainment (primarily live sports) and public affairs (primarily live news) programming that was then unavilable to them on a timely basis. Live or same day broadcast to the affiliates was given initial priority for daytime transponder use (prior to 5:00 p.m. AST). Any schedule changes will be made at network affiliate request.

RURAL ENTERTAINMENT AND PUBLIC AFFIARS:

The AFN Inc. Telecommunications Committee holds full authority for all bush prime time broadcasts. OT provided assistance in the form of listings of all available programs from all four national networks. Final decisions were made and a schedule compiled by OT from the Committee's selections.

Monthly Committee meetings reassess and/or modify broadcast schedules as user reaction indicates. OT is currently preparing a computer program to allow village responses to be systematically assessed and summarized by the Committee. OT has taken administrative responsibility for compiling schedules and distributing them State-wide on a monthly basis. The most formal viewer feedback comes from a simplified questionnaire on the back of every distributed schedule.

At the Committee's option, special programs of national or State importance will preempt entertainment or educational rural programming.

Responses have been received at OT from a majority of the participating sites. Since many of the villages have been receiving television for two months or less, the results cannot be conclusive. Of the 43 preliminary responses, the basic results are:

1. Most popular programs
   a. Six Million Dollar Man
   b. Bionic Woman
   c. The Waltons
   d. Donny and Marie
   e. Hee Haw
2. Least liked programs
   a. Sonny & Cher
3. Villagers want less basketball, preferring variety sports (Wide World of Sports, etc.)
4. Of the 43 surveys received, 32 indicated they wanted more movies, if viewing time was extended

As a result of these initial reactions, the AFN Committee has decreased the hours of basketball coverage and extended viewing time from 11:00 p.m. to midnight, adding repeats of legislative and national news.

EDUCATIONAL:

At OT's initiation, the availability of satellite time for educational broadcasting provides a needed opportunity for a variety of educational agencies to coordinate program planning to rural areas. While tasks and constituents vary, educators and public service agencies in Alaska share a common need to deliver timely information effectively to diverse rural Alaskans. This demonstration has helped provide focus to that effort through the utilization of instructional and educational television as one means of information distribution.

1. University of Alaska. A televised course in computer programming is uplinked from Juneau to single campus classrooms in Anchorage and Fairbanks. This course, broadcast twice weekly, was arranged on short notice to allow UOA participation this semester. Further planning by UOA will use this demonstration course as a cost-model for expanding telecourse offerings to make efficient use of teaching personnel. The potential reducation in travel costs and staff time is expected to be considerable. Continued

and expanded offerings next fall will allow full exploration of telecourses as a cost saving means of instruction.

UOA/Southeast Senior College will be participating in another variation of course offerings beginning March 30. A 13 hours televised course in general science and humanities will be broadcast to all rural villages, offered as a two credit, 393 level course. This again is a prelude due to limited planning time of the potential for rural adult education offerings. Village residents with some college will be encouraged to enroll, and offered credits will be suitable for teacher certification renewal credit. In addition, this course may be of interest to some high school students, although college credit will not be available to them.

The Department of Education is participating in disseminating information about the course which will be monitored at UOA/SE.

Future course offerings will be coordinated by UOA/Rural Education Affairs.

In addition, OT has coordinated the establishment of a committee representative of University, college and public education agencies to explore the implications of the TVDP and to make recommendations for further utilization of the project network. An orientation meeting was held mid February; continued sessions are planned.

2. Department of Education. Of the rural receiving sites, 18 are villages with public schools. Total enrollment is approximately 2,000 students, K-12. Virtually all of these villages currently offer at least partial high schools (ninth and tenth grade).

Two hours of daytime instructional courses were selected with the involvement of rural

teachers and the 12 individual participating school districts as previously outlined.

DOE's concentration of effort, now that programming has been selected by users and broadcast has begun, is to continue to make additional resource information available for maximum program use in the classroom.

Utilization and relevance to rural education will be closely monitored through May by DOE in a variety of ways. District and rural teachers' comments and reactions are being continually solicited. Site visits will be made as widely as possible. Detailed questionnaires for teachers, students and parents will help define the appropriateness, utilization and necessity for instructional television as a teaching tool in rural Alaska. The Center for Northern Educational Research will be conducting in-depth personal interviews with teachers in its five selected TV site villages this spring in conjunction with its in-depth study of the impact of TV in rural Alaska.

As a result of these formal and informal evaluations, fall program scheduling will be coordinated only when educators have had a chance to utilize current programming and identify any problem areas and identify the rewards it provides.

While it is too soon for conclusive user reaction to instructional television, formal documentation will be available by May 30. Indications to date, both solicited and unsolicited, are that district staff are pleased with the opportunity to participate with the newly available resource of television. There is strong indication that most teachers are enthusiastic about

the opportunity and all have been cooperative. There is some user concern about the rigidity of adhering to a broadcast schedule and fitting ITV programs into a pre-planned classroom day. To help ease this restriction, virtually all programs can be video taped by any location and kept and reused for seven days, after which time they must legally be erased. A desired addition to next fall's demonstration is some form of demand access programming. It would be of great interest to all participating rural schools to use the video channels for programs on request. While technical limitations may make such a request component unfeasible in the near future, it will be pursued and developed if possible.

The primary concern during this initial broadcast period for the remainder of the school year is that teachers, the ultimate users, be kept informed of programs, supplied with materials necessary to make each televised lesson an appropriate learning experience in individual classrooms, and that programming cover as wide a gamut as possible in terms of curriculum and age levels.

Work has also begun to involve the urban areas in receiving the ITV offerings, through existing cable and broadcast outlets. A continued TVDP would allow continued integration of programming and local school curriculum. An ultimately cost effective configuration for ITV distribution can only be accomplished with this economy of scale.

There is strong evidence to date, which can only be validated after further evaluation, that educators' involvement in program decision-making is a crucial step for maximum utilization in each village school. The information flow has been soundly based on past experience, and DOE's commitment remains to making information accessible and to allow maximum local options for participation.

The process to date has been successful. The broadcast schedule expands this month, offering not only directly instructional programming for students, but in-service training for teachers, and a for credit course in general science. The crucial need is for desired programming to be available at appropriate times for its potential audience. Given the restrictions on available time for education this may not always be the case and use may suffer as a result. Extensive project evaluation should supply important data in this regard.

Another implication of this project reaches all school districts, both rural and urban, identifying existing instructional television materials for their applicability and appropriateness to Alaskan students. Effective instructional programming, with its high cost and time requirements, need not necessarily be produced in this State to be worthwhile as a learning experience. Identification of already existing materials, and the hands-on experience in their delivery and utilization in rural Alaska will help supply needed and valid information to all districts in the State.

An important aspect of this demonstration is the ability of instructional television to help individualize instruction. In the framework of entertainment network programming, the mass audience is a necessity. Instructional and educational television is not packaging any product, and need not follow this dictate.

This makes the criteria for successful ITV more complex and not a mere popularity, size-of-viewer-audience contest. TVDP time allows the emphasis of instructional programming to shift to the quality of the programming as the teacher

chooses to use it. Could a State-wide television network have cost effective rewards in providing rural high schools with specialized courses? With an emphasis on identifying subject matter and grade levels effectively taught via television, can ITV provide a significant educational resource for specialized content? Evaluation of the TVDP through this remaining school year should help provide important data to answer these significant questions.

3. **Adult Basic Education/DOE.** The majority of TVDP site villages do not have a formal Adult Basic Education/GED equivalency program. ABE is utilizing 1-1/2 hours per week for a nationally produced basic skills learning program, for use both in and out of a formal ABE program. Response to date has been enthusiastic and there is indication that both village residents and high school students and teachers are viewing and using this program.

   The advantage of this project component is again to help identify existing video materials that work in a rural setting.

Evaluation and further demonstration in the fall of adult education programming will help supply important information for the cost-effectiveness of reaching a wider adult population through correspondence/television.

Sheldon Jackson Junior College. The two rented programs in business administration and psychology are currently reaching all 21 TVDP villages, as well as Sitka and Juneau through cable TV.

While UOA is focusing on upper division level courses, SJJC's demonstration will provide college credit courses at the first year level to village residents past high school who do not have local opportunity for continuing their education at home. Again, evaluation can help establish the validity of sound instructional video as a means of reaching off campus to interested residents at home.

Department of Health and Social Services. Preventive health information has long been an information priority at H&SS. The broadcast of general topic health films and information for a general audience can help fill the gap for these previously isolated villages and help establish the significance of making basic health information available visually on a consistent basis.

Indications to date are that these films are being used in the public schools, as well, for high school and junior high classes.

SECTION VII. ECONOMIC FACTORS

Distribution of television services on a State-wide basis, whether by local transmitter, video tape, translator or satellite is expensive.

The State government has supplied funding, often in response to pressure from localized interests and not in response to any policy guidelines.

State expenditures for extending entertainment television down the Kenai Peninsula and in the Bristol Bay Region is close to one million dollars.

When public funds have been used to construct public broadcast facilities in Bethel or mini-transmitters in rural villages the desire for entertainment as well as educational television

quickly became evident. Communities made various arrangements to obtain network programming, often violating federal copyright and communications act laws. Expense to these communities was considerable, King Cove was spending six to eight thousand dollars annually, St. Paul more, other villages less. The Bethel Film Club, providing entertainment tapes to the Bethel PBS station was reported to be spending $11 per program hour.

Some communities have taken it upon themselves to obtain television service. In Valdez for example, over $50,000 was spent for a translator system that never worked.

The urban broadcasters have spent several hundred thousand dollars bringing live coverage of news, sports and other special events into Alaska. This service has been rather limited for the costs incurred and a well utilized system such as the type under development for the Television Demonstration Project would offer the service at a much lower price.

The examples mentioned above are meant to illustrate one important point. "The extension of television services to places now served has in most cases been done in a haphazard manner."

If distribution of television in Alaska is to make economic sense and still provide desired services, some comprehensive planning must be done.

The manner in which economic support for an ongoing television distribution program is maintained has many aspects. The preferred method, not necessarily impossible, would be to have the users provide all of the funding needed. Not all of the support for the system should come from the commercial broadcasters. Agency users such as the Department of Education, the Department of Health and Social Services, the University of Alaska, etc. would, we hope, find the television services so cost effective that they could be supported from their operational budgets.

Following are some additional factors that should be considered:

Satellite vs. video tape distribution. The cost per hour of satellite distribution decreases rapidly as the number of hours of programming increase, whereas, in the same interval, tape distribution costs decrease less than 20% due to economics of scale.

To illustrate this tradeoff several assumptions must first be made. Some of these were arrived at from experience gained in other tape distribution systems, others are necessarily arbitrary in nature. With regard to a system of video tape distribution these are the key assumptions:

1. To reduce the number of copies that must be made of each program the tapes will be bicycled to several communities in turn with each keeping a tape for only one week (where possible) before shipping it on to the next in line with the last returning it to the duplicating center.
2. That eight weeks from the original air date in Alaska is the longest reasonable delay any site should experience in receiving programs (i.e. Christmas programs would air in March).
3. A tape can traverse the bicycle at an average rate of one site every two weeks, i.e. ten weeks total.
4. Based on experience it will be necessary to replace the tape stock twice per year.
5. Special fourth class postage is used.
6. Maintenance of playback VTR is on an exchange basis, their useful life is estimated to be 2,000 hours of operation.

The number of bicycles necessary to satisfy assumptions two and three is 40 (i.e. eight weeks total delay at two weeks per site gives four sites per bicycle, 160 sites require 40 bicycles). It actually takes ten weeks for a tape to traverse the bicycle and return to the duplicating center. This is 70 days plus 70 tapes for each hour of programming are required for each bicycle. To this a contingency

supply of 25% must be added to account for delays in shipping resulting in a requirement for 3,500 tapes in the system for each hour of programming. The current market price of one hour video cassettes is around $21. If a quantity discount of 20% is assumed the cost per program hour for tape is $117.64 on a yearly basis.

Special fourth class book rate postage is 30 cents for a one-hour video cassette. The cost per site is therefore 30 cents (i.e. 30 cents / 4).

Dubbing costs will vary with the number of hours per day of programming dubbed, due to economics of scale and are estimated as follows:

HRS PER DAY	COST PER HOUR COPY	COST PER SITE
1	$6.00	$1.50
2-3	4.00	1.00
4-5	3.00	.75
6-8	2.50	.63
9-12	2.25	.56

Tape machine cost is based upon a capital cost of $1,500 amortized over 2,000 hours ($0.75/hr) plus maintenance costs of $100 every 500 hours ($0.20/hr) for a total of $0.95/hr.

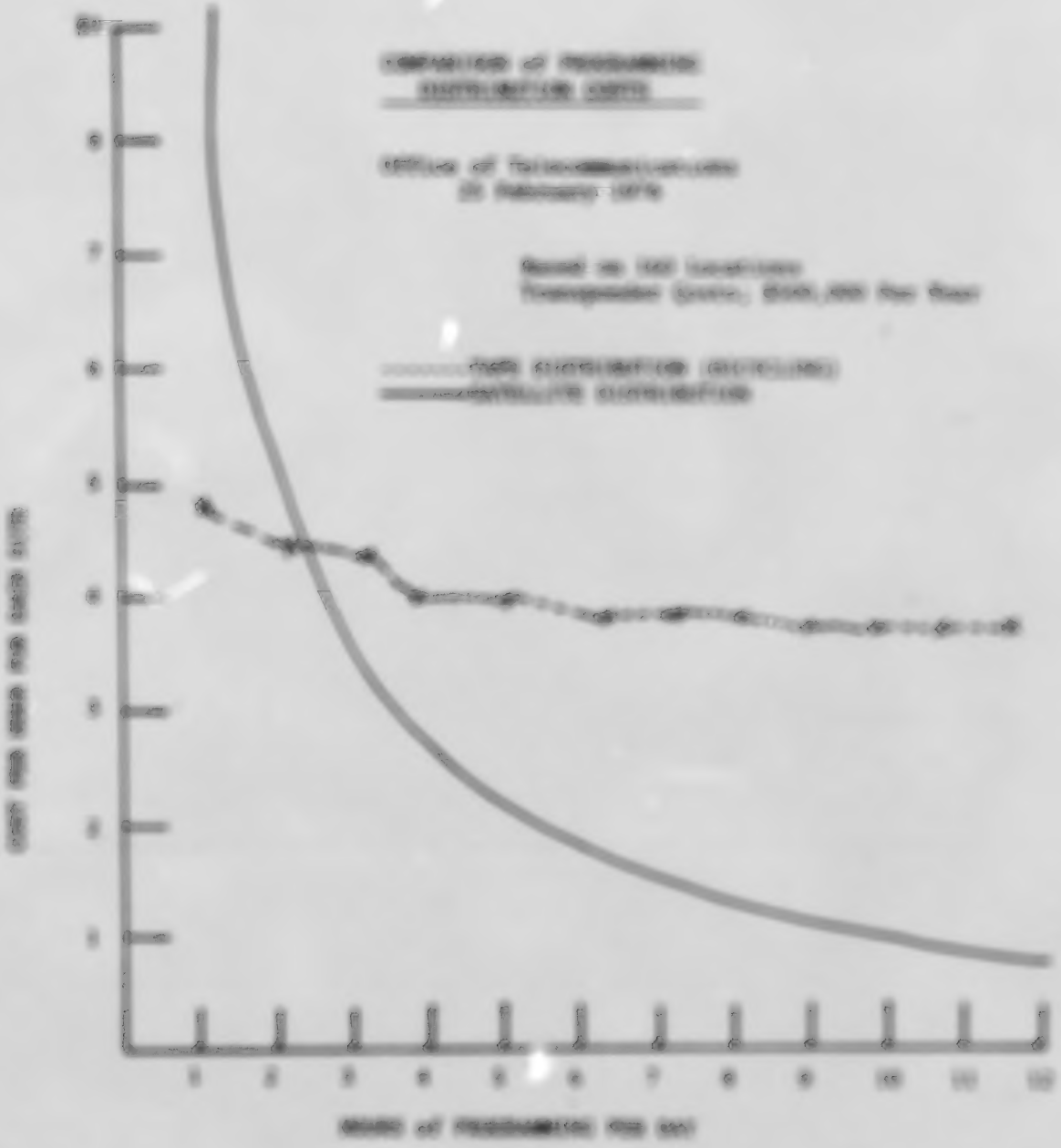
Assuming 10% administration costs the totals are as follows on a per hour cost at each site. These costs are not highly sensitive to the number of sites, so long as it is 50 or greater.

HRS PER DAY	TOTAL COST
1	$5.34
2-3	4.79
4-5	4.51
6-8	4.38
9-12	4.30

Satellite costs are much more sensitive to the number of sites served. On the assumption that a satellite TV channel is leased at the full time rate of $500,000 the table on the following page shows the cost per hour at each site for three network sizes, for convenience the tape distribution costs are repeated for comparison.

HOURS PER DAY CHANNEL IS USED	TAPE COST		COST PER HOUR OF EACH SIZE*		
			AS RATED	LESS RATED	ABS RATED
1	[illegible]		[illegible]	[illegible]	[illegible]
2	[illegible]		[illegible]	[illegible]	[illegible]
3	[illegible]		[illegible]	[illegible]	[illegible]
4	[illegible]		[illegible]	[illegible]	[illegible]
5	[illegible]	Tape	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	Satellite	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]		[illegible]	[illegible]	[illegible]
10	[illegible]		[illegible]	[illegible]	[illegible]
11	[illegible]		[illegible]	[illegible]	[illegible]
12	[illegible]		[illegible]	[illegible]	[illegible]

Below this comparison is shown in graphic form. From these comparisons it is easy to see the economic cost reductions associated with satellite distribution.



Cost savings associated with satellites aside, tape distribution to a large proportion of Alaska's communities would be extremely difficult if not impossible. Consider the impact of the 3,500 video tapes,* which would be in the distribution network at any given time, on the bush mail service. A week's tapes for one village to provide 10 hours per day of programming would weight 140 pounds and occupy substantial space. Size and weight considered the tapes would bump one passenger on the mail plane. Such an enormous load on the postal carriers might well alter the flow of normal mail.

Another problem associated with tape distribution is that when tapes are damaged before they reach the end of the bicycle the remainder of the stations on that bicycle may be unable to play these programs.

Maintenance of the video cassette players would pose a logistical problem. For the 10 hour per day case, approximately 100 video tape players would require maintenance each month, which implies at best 100 extra video tape players for exchange use since a maintenance turnaround of one month is reasonable to assume.

The experience of film libraries bears out the gloomy projections for a distribution service using mailed tapes to large numbers of remote locations.

AGGREGATION OF USERS

Based on the experience gained this far in the TVDP it appears that there is a significant potential for a sharing arrangement between satellite users.

Commercial Broadcasters--As mentioned previously commercial broadcasters have spent considerable sums on bringing "live" television into the State. These same services combined with the requirements of other

*The aggregate length of these tapes would be about the same as the Alaska Pipeline.

users would allow bulk procurement of services at a reduced rate. In fact, as a result of the TVDP development of dual video channel per transponder techniques close to twice as much service could be provided at the same cost.

This same bulk buying could make possible direct network interconnects to the lower 48 if network signals received wide (State-wide) distribution.

It's our preliminary conclusion that commercial profit oriented companies should pay for the services provided. However, the cost of these services must be competitive with existing expenditures.

Cable Television--At this point in the TVDP we are just working out the details to get cable systems participating in the project. Expenditures for video tape programming runs approximately five dollars per hour or over $21,000 per channel per year. Having cable systems tied into a shared system overcoming some of the copyright problems should make available additional sources of revenue to support an ongoing system.

Non-Network Users--Utilization of television techniques has tremendous implications for instruction and educational delivery, not only from a content standpoint, but as an economic alternative for delivery of certain services.

The Dean of the School of Engineering for the University of Alaska, Charles E. Behlke, stated:

"For 16 years professors of engineering have traveled to various locations in Alaska to teach continuing education, and graduate engineering courses in engineering management, civil engineering, arctic engineering and environmental engineering. Our market is well defined and includes students in the population centers of Prudhoe Bay, Fairbanks, Nome, Kenai, Kodiak, Anchorage, Valdez, Juneau, Ketchikan, and

Sitka. Because of travel costs, wear and tear on professors, and the difficulty of only having a professor at one location at a given time, our service to Alaska has not resulted in as broad a coverage as the customers would like. Many of my faculty, including myself, view the present and potential satellite television network with two way audio as a very plausible method of delivering our program to almost every practicing engineer in Alaska who desires continuing education.

My present estimate of potential University television usage is a minimum of two channels and a maximum of six channels, for four hours per evening, five to six evenings per week. Daytime broadcasting would consist of a minimum of two channels, eight to ten hours per day. This could expand to four channels, eight to ten hours per day.

At the present dollar rate for a satellite channel it would be necessary to replace, or more likely not hire as the market expands, approximately six to seven professors. All the direct and indirect costs for each professor must be considered in order to have costs break even. In the interest of expanded services with the present teaching staff, courses would have to be seen in a minimum of seven locations at once in order to break even on costs. I think even in something as specialized as engineering, the market would easily support such services.

Undoubtedly, as the technology develops over the coming months, the costs of transmission per unit of time and per unit of audience will drop substantially. However, at the same time costs of professors probably will continue to skyrocket. Thus, I estimate from the past trends of satellite costs and professor costs in two to three years the economics will cost as much as a satellite channel.

I believe the satellite broadcasting of live

classes should logically expand in the next few years if the satellite costs can be reduced to a minimum economic level and if prime day and evening time is available (14 to 18 hours per day per channel). It would also be necessary to have the capability to receive several channels in the urban areas and in the bush villages to meet the potential market dictated by varied educational interests. In planning and purchasing hardware it would be very wise, I believe, for the Office of Telecommunications to provide for multichannel sending and receiving capabilities."

The Department of Education, although possibly not seeing the same utilization recognizes the potential economic benefits if television can be transmitted at a reasonable rate.

Other uses, such as video conferencing, can offer alternatives to transportation. Diagnostic medical treatment is yet another possibility and the list can go on.

Rural Economics--Once we get away from the coastal communities where fishing offers a livelihood we find ourselves facing primarily a subsistance economy in rural villages. Cash flow in these communities is small and cash is generally secondary to the gathering and storage of food.

Speaking particularly of the provision of entertainment television to rural communities, coupled with the desire to have users pay their own, this service would have to be provided at a minimal cost. Since the cost per individual user will drop with the increase in the amount of users, it would be fair to say that television must reach as many people in the State as possible.

Perhaps a social policy decision must be made for the distribution of entertainment programs. Usually the communities that need the services the most are the ones most isolated where the cost of providing service is the highest. The concept of paying a "fair share" somehow proportional to the local economy should be explored.

SECTION VIII. OBSERVATIONS AND CONCLUSIONS

This section presents our views regarding the Television Demonstration Project to date, drawing upon our experience and the responses we have received.

The project is going very well despite a late start, and we feel that the legislative intent is being adequately met. Much has been learned and many obstacles have been overcome. Because of the unprecedented nature of the TVDP there was strong resistance from some sectors, especially the broadcast community. Once the various parties developed an understanding of each others' concerns many barriers, probably resulting from protective instincts, were eliminated. We feel the cooperation has been very good and are pleased that when faced with a real situation, as opposed to a hypothetical one, problems were resolved.

The project has demonstrated that the technology is adequately available and developed for provision of television into rural Alaskan communities at a reasonable cost. Dual channel television techniques used to deliver signals into the urban areas has demonstrated that good service can be provided, at a more realistic cost than previously thought possible.

The Television Demonstration Project has been criticized primarily on the basis that there should have been more planning before initiation of effort or that the funds could have been better spent on other aspects of broadcasting. In issues of this nature there will never be a consensus for we will never be able to satisfy everyone that there is a single goal and an ideal way of reaching it. Possibly a year of study would have prepared the way for a universally accepted program. We have seen Alaska nearly studied to death in many fields with very little results. In telecommunications over the last decade many hundreds of thousand dollars has been expended in studies that have done little more than fill up bookshelves. We keep telling ourselves the same thing, year after year. Without any doubt, however, more time spent on specific planning for the present project

would have made us better prepared. It also would have delayed inception of service even longer and even then, many of the problems wouldn't have surfaced until the project was actually underway. Not until a decision-maker has to commit funds he is responsible for, do the true priorities really become defined. One of the merits of a pilot project as this one is, is that we learn by doing and are much more likely to discover what the truly significant factors are than can be done by hypothetical studies alone. Yet, because full-scale commitments are not made, there is ample flexibility to optimize the ultimate program. It is analagous to testing the water by putting one's toe in as opposed to looking at it or jumping all the way in.

Comments which were related to the nature of the project and its management expressed valid concerns that should be considered in establishing a plan for continuing operations. The issues of radio versus television, centralized versus local control, the role of the Governor's office in operational programs, and the provision of overlapping services were raised. We believe these are among the problems intended to be resolved by the project, but they also reinforce our conviction of the need for comprehensive planning and policy development for telecommunications in Alaska.

Practically all of the response from the viewers, as opposed to professionals with broader interests, has been positive. While not everyone likes all the programming, there is nearly unanimous support for television in the bush and for more live TV in the cities. Part of the success of the concept is demonstrated by the complaints from communities not included in the project. One of the initial fears is being realized, for people are growing accustomed to the service and will insist that it not be terminated. We believe it is inevitable that, in a few years, every community will have satellite delivered television; the quesion is how, not whether.

Because of the timing of the project there is not enough information at this time upon which a plan for continuing of

operational services can be made. Obtaining the facilities, the funding, and the organization, to provide for transmission of television, both entertainment and instructional, into and throughout the State, implies a complex program that should not be hastily developed. More time is needed to observe current operations and to assess user requirements. Various alternative solutions need to be refined and evaluated before firm recommendations can be made. The views from all affected by this far-reaching concept must be considered throughout the planning process. We hope this preliminary report will provide the basis for continuing effort to determine the future role of the State in this area. The remaining sections outline possible alternatives for consideration and recommendations for developing the information needed for decision making.

SECTION IX. FUTURE ALTERNATIVES

The approach that has been taken in the implementation of the Television Demonstration Project is not necessarily intended as a recommendation for continuing operations. The tight time schedule of the TVDP required making the best use of existing facilities and organizations which do not necessarily represent the best way of providing the desired services on an ongoing basis. The primary objective was to implement service in order to obtain data needed for planning the operational system; or, in fact, determining whether or not an operational system is feasible.

For the present, until a comprehensive, overall plan can be established, it is important that as many options be kept open in order to maintain a flexible approach. Various alternatives, to the extent that they have been developed so far, are discussed below under three headings: 1) the telecommunications delivery system, 2) organization and management, and 3) funding.

Telecommunications Delivery System--One of the prime objectives of the TVDP is to determine what the optimum means of bringing television programming into the State is, and how to best distribute it within Alaska. As there are many links

in the various communication chains needed to provide all desired services, this subject becomes a complex, multi-dimensional problem. Further study is needed to reduce the options to a meaningful few for serious consideration. Some of the broad alternatives are discussed below. At all times during the study of the delivery system trade-offs between the type and amount of service and the cost have to be made. This affects the utilization of the system and thereby determines the amount and method of funding that is possible. For this reason, it is imperative to have some operational experience being developed as planning goes forward. It is simply not reasonable to initiate a comprehensive system of the type being considered after only analytical studies have been made; data from the real world are needed. Some of the options and factors to be considered are discussed below. Only the primary alternatives are discussed; there are many combinations and variations among them.

Common Carrier Approach--At this time, RCA Alascom is providing most of the interconnection services utilized in the project. Since they are a franchised common carrier they would be expected to have most of the facilities available and be able to accomodate increases in service requirements without great difficulty. They would also be expected to have the operating and maintenance personnel needed on a statewide basis to maintain good service at all times. Because they are regulated by the Alaska Public Utilities Commission and the Federal Communications Commission, they must adhere to rather complex and inflexible tarrif regulations with the apparent result that the cost of service is high.

Theoretically, the incremental cost of equipping an existing earth station with television receive capabilities should be less than building a new earth station.

Special Systems Approach--One of the major problems in locating transmit earth stations is that radio frequency restrictions at the 4-6 GHz frequencies generally preclude location in or close to major urban areas. Signals from or to

the urban areas are carried via microwave link to the remotely located earth station. This microwave link, particularly if it is more than one hop, might more than offset any cost savings resulting from the use of the satellite.

Receive only earth stations, located close to broadcast or cable television stations, should be considered for television reception. These stations could be owned directly by the broadcasters or through a sharing arrangement with other broadcasters or television users in the area.

Consideration should also be given to new frequency bands being opened up for satellite transmission. Initially, for transmit earth stations that could be located in or near broadcast originating points in urban areas and finally, as utilization reaches existing system capacity, towards a system optimized for television distribution.

Local Distribution--In areas where there are existing broadcast or cable television outlets signals should be distributed by these established entities.

In very small rural communities, electric power is usually at a premium both in availability and cost, and adding many television sets which use 100 or more watts each may be an unnecessary burden on the village electric power supply. In these cases it may make better sense to provide one or two central viewing places, such as the community center or school, to minimize the power requirements.

In rural communities where adequate power is available, distribution of the television signals to individual houses would be feasible. The choice of mini-TV or cable is influenced by program rights considerations and somewhat by other technical and economic factors. It appears that, at least in the single channel case, mini-TV is the less expensive approach. As the number of channels increases a cross-over between adding mini-TV transmitters and cable with its multi-channel capability occurs. The exact number of channels above which costs less to use cable, depends on village size, and layout, availability of utility pole space, or soil conditions

for buried cable. In any case, an initial investment in a mini-TV transmitter is not wasted, because it can be used to provide a signal for one channel on a cable, if cable is installed at a later time. Mini-TV has the advantage of requiring only one day for installation compared to several weeks at the least for a modest sized cable system.

Organization and Management. The Office of Telecommunications in the Office of the Governor should not be operating a television distribution system within the State of Alaska. We feel it is appropriate to assist during the formulative phase of the project, to stimulate and guide activities during the preliminary stages. What type of organization should manage the system? The extremes range from leaving the task solely to RCA Alascom, the common carrier, to establishing a State-owned and operated system.

It is premature to consider leaving the job in the hands of Alascom, for history has shown that established utilities tend to adhere to the status quo and do not have great incentive to push their technology to benefit the customer--especially potential customers for new, unoffered services. It is much easier to sell the types of circuits that one has plenty of.

Some type of organization, whether it is a consortium or a nonprofit agency set up within or outside the government, that more truly represents the user might be needed. The formation of a users association appears possible under the Communications Act and Rules of the FCC. Based on our preliminary analysis it appears that there is significant potential for a sharing arrangement between television satellite users in Alaska. Each user could be responsible for building its own satellite earth station, and the nonprofit, sharing entity could divide the costs of satellite capacity proportionately among the users. The nonprofit entity could also administer the system and be responsible for the payment of tariff charges to the carrier. This group could have significant bargaining power and may be able to obtain very favorable terms like those which Hughes and other users will

obtain under the new RCA Americom tariff. Because commercial and government (and likely other) users would probably be represented by such an agency, it may be advisable to have it operate outside the framework of the State Government. It will take some study and review to develop options in this field.

It should be noted that the discussion here pertains to the operation of the distribution system, not to the programming that is carried over it in any manner. This is mentioned to make it clear that this type of operation is not the type of activity appropriate for the Alaska Public Broadcasting Commission which is charged with the task of promoting and assisting the development of public broadcasting in the State.

Funding Arrangements--The most desirable funding arrangement is, of course, to have each individual user pay for the services provided.

System costs are relatively fixed. For example in the TVDP we know that for a period of one year we can transmit television programs into 23 villages and five urban areas 24 hours a day for a cost of $1.5 million. The system hourly cost is therefore $171.23 ($1.5 million÷ 8760 hours) at 100% utilization. If we deliver an entertainment program to 23 villages the hourly cost to each village is $7.44 ($171.23÷23). If a signal is provided to network stations in three urban areas the hourly cost would be $57.07 per station ($171.23÷3) or if dual channel techniques were used and two signals were delivered into three urban areas the hourly cost would be $28.54 ($171.23÷6).

The above examples are meant to illustrate that once total system costs and utilization are known that there are ways to determine costs to individual users.

At this point in the TVDP there isn't sufficient information to determine the value of services to the potential users of an ongoing system.

We know that commercial broadcast and cable systems have current expenditures for programming what they would contribute

towards an ongoing system is yet to be determined.

Some rural communities have expended considerable funds for entertainment television. The economic base of other rural communities and their potential contribution needs to be considered.

Obviously in the fields of education, social services and medical diagnostic work television has tremendous potential, particularly with interactive capability. The value, once again, of television as a medium for these services needs further study.

Finally, it may not be inappropriate for the State to make a contribution on a State-wide basis to help compensate for the fact that Alaska is not adjacent to the rest of the country and therefore not in a position to receive the same services as other (excepting Hawaii) states do.

In accordance with Governor Hammond's wishes the public should be consulted if public funds are required to guarantee continuing services.

SUMMARY

We believe that it is a matter of policy, if only tacitly held, that the government should avoid involvement in operational services, if at all possible. Thus, unless no private organization is available, State ownership and/or operation of the communications facilities should be discouraged. This does not mean that State coordination of users, aggregation of their demands and brokerage of services should be arbitrarily ruled out.

Only a cursory discussion of the alternatives can be given at this time. The main task ahead, during the remainder of the project, will be to define and describe viable options with enough detail to allow intelligent choices to be made. In addition to the need for more data on preferences, values, and priorities, which require more time and operating experience, the insight and cooperation of many individuals will be required to develop acceptable solutions.

SECTION 2. RECOMMENDATIONS

In addition to working with individual and potential television users during the TVDP the Office of Telecommunications will be forming two working groups, one technical and one economic, to explore and evaluate the various alternatives we have before us.

Specifically the technical working group will have the responsibility to evaluate all technical aspects of the Television Demonstration Project, define technical alternatives to the initially established dual channel and both formats and make technical recommendations for a system design for a State-wide distribution system for both interstate and intrastate television services.

The economic working group will deal primarily in defining costs based on the various alternatives established by the technical working group. An analysis will be performed regarding the economic base of the various users, aggregation of user requirements into a cost effective delivery system and exploration of pricing alternatives to deliver services.

Work will continue through the television advisory committee to define methods in which entertainment programming can be distributed consistent with network agreements, copyright restrictions and FCC laws.

Although we will be implementing methods to get more direct feedback regarding rural program selection the RPO Telecommunications Committee will continue to provide direction to our office regarding rural telecommunications policy issues.

Due to the late start of the TVDP and the lack of available data to recommend an ongoing State-wide television distribution program the Office of Telecommunications recommends the following:

1. That the Office of Telecommunications be granted an extension of time to supply a report to the Legislature for an ongoing plan for the distribution of television services in Alaska. This report will be provided prior to January 9, 1978.

3. That consideration be given to appropriating funds to continue the reclamation project at the current level of operation through fiscal year 1978 so that an ongoing plan can be dealt with next legislative session.

4. That the project not be expanded in those segments prior to approval of a State-wide Reclamation plan and allocations of such channel.

5. That if public funds are utilized in segments that the public ingress may are in favor of such segments.

APPENDIXES

Original sponsor: Health, Education and Social Services Committee

Offered: 5/26/76
For Today's Supplementary Calendar

IN THE SENATE BY THE RULES COMMITTEE

HOUSE CS FOR SENATE BILL NO. 696 (Rules)

IN THE LEGISLATURE OF THE STATE OF ALASKA

NINTH LEGISLATURE - SECOND SESSION

A BILL

For an Act entitled: "An Act making a special appropriation to the Office of the Governor, office of telecommunications; making a special appropriation to the Alaska Educational Broadcasting Commission; and providing for an effective date."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* Section 1. The sum of $1,500,000 is appropriated from the general fund to the Office of the Governor, office of telecommunications, for a satellite transponder lease project to demonstrate the feasibility of satellite communications in Alaska, priority being given to satellite television.

* Sec. 2. The sum of $150,000 is appropriated from the general fund to the Office of the Governor, office of telecommunications, for the purpose of establishing a public radio network.

* Sec. 3. The sum of $100,000 is appropriated from the general fund to the Office of the Governor, office of telecommunications, for the purpose of providing television production costs for legislative coverage.

* Sec. 4. If the production studio of the governor's office of telecommunications is transferred to another department, the appropriations in secs. 2 and 3 of this Act are transferred with the function.

* Sec. 5. The sum of $75,000 is appropriated from the general fund to the Alaska Educational Broadcasting Commission to pay public broadcasting system earth station lease costs of $25,000 each for educational broadcasting stations at Anchorage, Fairbanks, and Bethel.

* Sec. 6. This Act takes effect July 1, 1976.

Alaska State Legislature

Senate

JUNEAU, ALASKA

The Honorable Chancy Croft

It is the intent of the Senate Health, Education, and Social Services committee in introducing and passing Senate bill # 696 to provide a pilot satellite television project for the state of Alaska.

The $1.5 million appropriation is designed to provide a full-time satellite transponder leased for one year. This will provide one channel of television for selected villages, and bring live satellite coverage to the urban areas. The transponder may also be used to implement Health and Education video services to Alaska.

The appropriation goes to the Governor's Office of Telecommunications (GOT). The GOT is responsible for the completion of the project, however they have the authority to contract with any other state agency or private contractor for assistance with the project.

The village site selections shall be made by the Alaska Federation of Natives telecommunications committee, with the concurrence of the GOT. The AFN committee will work with the GOT and the AEBC in determining programming.

Commercial and Public broadcast stations with access to a large earth station will have the opportunity to receive network programs via the state-leased transponder. This will offer same-day viewing for many network programs, and allow live satellite broadcast for public affairs and special events state-wide.

This pilot program will offer the opportunity to determine the best technical and administrative procedure for a state-wide program. The GOT shall report to the next legislative session their recommendations for the implementation of a state-wide satellite television system.

LETTER OF INTENT

HCS SB 696

It is the intent of the House Finance Committee in offering HSC SB 696 to provide a pilot satellite television project for the State of Alaska.

The $1.5 million appropriation is designed to provide a full-time satellite transponder leased for one year. This will provide one channel of television for selected villages, and bring live satellite coverage to the urban areas. The transponder may also be used to implement Health and Education video services to Alaska.

The priority use for a state-leased transponder is to provide television coverage for public and commerical facilities in urban and rural areas. To the extent that time is available beyond this basic intent, the GOT shall utilize the satellite time for any use in the public interest. The GOT shall include in the report to the legislature a plan for comprehensive satellite use, not limited to television broadcasting.

The appropriation goes to the Governor's Office of Telecommunications (GOT). The GOT is responsible for the completion of the project, however they have the authority to contract with any other state agency or private contractor for assistance with the project.

The village site selections shall be made by the Alaska Federation of Natives telecommunications committee, with the concurrence of the GOT. The AFN committee will work with the GOT and the AEBC in determining programming.

Commercial and Public broadcast stations with access to a large earth station will have the opportunity to receive network programs via the state-leased transponder. This will offer same-day viewing for many network programs, and allow live satellite broadcast for public affairs and special events state-wide.

This pilot program will offer the opportunity to determine the best technical and administrative procedure for a state-wide program. The GOT shall report to the next legislative session their recommendations for the implementation of a state-wide satellite television system.

Section 2 of this bill appropriates $150,000 from the general fund to the GOT studio for the purpose of establishing a state-wide public radio network. The radio network shall interconnect existing public radio stations to share existing programs and provide an economic method of distributing state-wide radio programs.

The public radio network shall program certain legislative hearings and include in the format calls from constituents who wish to present testimony on selected committee hearings.

Section 3 provides $100,000 for the purpose of providing a video legislative information service to all broadcast stations, public and commercial, throughout the state, and moving the GOT studio to the capitol building, if space becomes available.

If the production facility is transferred from the GOT, the funding for section 2 and 3 is automatically transferred with the facility.

Hugh Malone, Chairman
House Finance Committee

CONTRACT FOR SERVICES BETWEEN THE
STATE OF ALASKA AND RCA ALASKA COMMUNICATIONS, INC.

This Contract for Services, made and entered into this 21st day of December, 1976, by and between the State of Alaska ("State") and RCA Alaska Communications, Inc. ("Alascom") supersedes the memorandum agreement dated October 14, 1976, concerning provision of television services to both bush villages and urban locations in the State of Alaska under a demonstration project.

ARTICLE I - PURPOSE

This contract is for the purpose of providing inter-state and intra-state television service to twenty-three (23) bush village locations in the State of Alaska and to Anchorage, Fairbanks, Juneau, Sitka and Bethel under a Television Demonstration Project to fulfill the television portion of the intent of HCSSB 696, a Telecommunications Bill enacted by the Alaska State Legislature. [A copy of which is attached hereto for reference as Attachment I.] RCA Alascom shall provide television services as described herein and the State shall pay for such services under the terms and conditions hereinafter set forth.

ARTICLE II - SERVICES

A. GENERAL DESCRIPTION

RCA Alascom shall procure inter-state and provide intra-state television service from RCA American Communications at earth stations at South Mountain, CA, Point Reyes, CA, and an east coast earth station to twenty-three (23) bush communities as well as Anchorage, Fairbanks, Juneau, Sitka and Bethel RCA Alascom local offices.

RCA Alascom shall provide installation of all equipment used to provide the television services between RCA Alascom locations within Alaska subject to the provisions of Attachment II. RCA Alascom shall provide maintenance and operation of all equipment up to, but not including, the television transmitters in the twenty-three (23) bush communities.

RCA Alascom shall not be responsible for providing any interconnect facilities between each specified RCA Alascom location and the user parties.

RCA Alascom shall not be responsible for the maintenance and operation of the twenty-three (23) bush community television transmitters and associated antenna equipment.

Each of the following stations will be equipped to provide the capabilities indicated:

B. ANCHORAGE TOLL CENTER

Existing one video/audio channel between Anchorage Toll and the Bartlett Earth Station for both originating and receiving program material. Second existing video/audio channel from Bartlett to Anchorage Toll will be provided subject to conditions outlined in Section N. Feed for up to five distribution interfaces will be available for local users. Originating program will be accepted from one of the five interfaces for transmission to Bartlett.

C. FAIRBANKS TOLL CENTER

Existing one video/audio channel between Fairbanks Toll and the Bartlett Earth Station for receipt of program material. Second existing video/audio channel from Bartlett to Fairbanks Toll will be provided subject to conditions outlined in Section N. Feed for up to three distribution interfaces will be available for local users. No originating program capability will be provided.

D. JUNEAU TOLL CENTER

Existing one video/audio channel between Juneau Toll and Lena Point Earth Station for both originating and receiving program material. Feed for up to three distribution interfaces will be available for local users. Originating program will be accepted from one of the three interfaces for transmission to Lena Point.

E. SITKA TOLL OFFICE

Existing one video/audio channel between Sitka Toll and Lena Point Earth Station for receipt of program material. Feed for one interface will be available to the local users. No originating capability will be provided.

F. BETHEL TOLL OFFICE/EARTH STATION

1. Addition of one video/audio channel with feed for one interface to the local user for receipt of program material. No originating program capability will be provided.

2. Addition of video/audio channel for receiving program material in conventional format.

3. Addition of capability to convert added conventional format downlink facilities for uses with bush format.

4. Addition of, subject to Article V, capability to receive either one of two simultaneously transmitted video/Audio channels.

G. BARTLETT EARTH STATION

1. Existing one video/audio channel from Bartlett Earth Station to Anchorage and/or Fairbanks Toll for receipt of program material.

2. Existing one video/audio channel between Anchorage Toll and Bartlett Earth Station for originating program material.

3. Existing video/audio channel up-link to and down-link from the satellite for originating and receiving program material in conventional format.

4. Addition of capability to convert existing up/down link facilities for users with bush format.

5. Addition of, subject to Article V, capability to receive two simultaneous video/audio channels with transmission of one channel each to Anchorage and Fairbanks Toll Offices.

H. LENA POINT EARTH STATION

1. Existing one video/audio channel between Lena Point and Juneau Toll for both origination and receipt of program material.

2. Ex[illegible]e video/audio channel up-link to and down-lin[illegible] from the satellite for originating and receiving program material in conventional format.

3. Existing one video/audio channel from Lena Point to Sitka Toll for receipt of program material.

4. Addition of capability to convert existing up-down link facilities for use with bush format.

5. Addition of, subject to Article V, capability to receive two simultaneously transmitted video/audio channels for transmission of one to Juneau Toll and of one to Sitka Toll.

I. ANCHORAGE AND FAIRBANKS TOLL CENTERS

Subject to Article V, when two simultaneous transmissions of program material are provided for distribution to Anchorage and/or Fairbanks, an occasional use 2-way video/audio channel between Anchorage and Fairbanks Toll Centers will be established.

RCA Alascom will arrange with RCA Americom to have the following stations equipped to provide the capabilities indicated:

J. SOUTH MOUNTAIN EARTH STATION (LOS ANGELES)

1. Addition of one video/audio channel up-link to the satellite for origination of program material in both conventional and bush formats.

2. Addition of one multi-channel TV receiver for off-the-air pick-up from local TV stations with interface to the up-link facility.

3. Addition of, subject to Article V, a second TV receiver for off-the-air pick-up and the capability to transmit two simultaneous video/audio channels to the satellite.

K. POINT REYES EARTH STATION (SAN FRANCISCO)

Existing one video/audio channel up-link to the satellite for origination of program material in the conventional format only. Existing multi-channel TV receiver for off-the-air pick-up from local TV stations with interface to the up-link facility.

L. EAST COAST EARTH STATION FEED

Arrangements will be made with RCA Americom to establish an east coast feed point for origination of program material. The originating station will be equipped with one video/audio channel up-link facility for conventional format transmission to the satellite and one off-the-air pick-up TV receiver for program pick-up from local stations.

M. TRANSPONDER

RCA Alascom shall lease and make available for the TV Demonstration Project use of transponder 23 on the Satcom F-2 spacecraft subject to terms, conditions and limitations of applicable tariffs. Transponder 23 on Satcom F-2 is a pre-emptible, unprotected transponder in accordance with RCA Americom Tariff No. 5.

N. SCHEDULING

Transponder 23 on Satcom F2 shall be available 24 hours per day subject to Articles IV and VII of this agreement.

The remainder of the facilities except the TD2 Microwave System between Anchorage and Fairbanks are available for the Demonstration Project subject to normal pre-emption for message toll back-up and maintenance.

The TD2 Microwave System between Anchorage and Fairbanks is available subject to scheduling by the State and approved by RCA Alascom. This system is a primary back-up system for message toll and is used by RCA Alascom for other commercial service.

The State will submit its proposed schedule for use of the system fourteen (14) days in advance of programming for the purpose of assuring system availability. The State may request additional programming after the fourteen (14) day scheduling requirement and RCA Alascom will schedule the programming if the system is available. However, RCA Alascom cannot guarantee that the requested time will be available. RCA Alascom will advise the State of any conflicts in scheduling involving the TD2 System between Anchorage and Fairbanks within two (2) days of receipt of the State Schedule.

Before each scheduled use of system facilities, at times when the transmission format may change or when a change is made from one designated originating or receiving station to another during such periods of scheduled usage where patching or other changes in the system configuration may be made, five minutes of switch and line-up time will be required to reconfigure the system. During such switch and line-up period the system shall be deemed unavailable for service. (Attachment II hereto defines the scope of work. Attachment III hereto defines the technical parameters to be accomplished by RCA Alascom and the State to provide the services described herein and both are incorporated herein by reference and made a part hereof.)

ARTICLE III - COSTS FOR SERVICES

For and in consideration of RCA Alascom providing the above services, the State shall pay Alascom the sum of $959,850 payable in advance in twelve (12) equal monthly installments of $79,987.50 payable upon commencement of service (commencement of the demonstration program shall be defined as that time when the transponder is first used for this service excluding preliminary testing). This amount covers the costs of all services except uplink charges from the contiguous 48 states which shall be paid by the State to RCA Alascom according to and at the times specified in the rate schedule set forth in Attachment IV which is incorporated herein by reference and made a part hereof.

ARTICLE IV - PRE-EMPTIBLE SERVICES

Portions of the intra-state terrestrial equipment used to interconnect RCA Alascom toll offices and used in the Television Demonstration Project will also be used for back-up of message telephone service. RCA Alascom may therefore interrupt the availability of the systems, or portions thereof, to the State for restoral of message telephone service or in the event of national or State emergency.

For the purposes of this contract, the term unprotected pre-emptible transponder shall mean that the transponder is not backed-up by another transponder and that it is used on a pre-emptible basis as a back-up for a protected transponder and will be pre-empted only in the event of the failure of a protected transponder and only for the duration of the failure of a protected transponder.

Should a pre-emption occur to the originating inter-state facilities, including the transponder, and should the State determine not to cancel this contract, the State will be credited for the pre-empted time for use within one month after the end of the term of this contract.

In the event that the system becomes unavailable because of equipment failure in the originating inter-state facilities, including the transponder, but not including intra-state facilities described above, the State will be similarily credited for down time for use within one month after the end of the term of this contract, provided, however, that system outages of less than 30 minutes on each occurrence shall not be deemed as outage time for credit purposes. In the event of equipment failure for any outage for a period over thirty (30) minutes at the Bartlett, Lena Point and Bethel earth stations, the State shall receive an hourly rebate equal to .003 percent of its monthly contract installment price as provided in Article III for all scheduled time lost. No credit shall be given for failure of any equipment that is owned by the State.

ARTICLE V - DUAL CHANNEL TELEVISION SERVICE

RCA Alascom has participated, and will continue to participate, in development of facilities to provide trans-mission of two simultaneous television programs through one satellite transponder.

Conditions of Dual Channel Television

1. RCA Alascom will exert its best effort to insure that all use of dual channel television facilities meet commercially acceptable standards as to quality of transmission. RCA shall not be responsible for any degradation to quality of transmission as a result of inability of the dual channel facilities, as provided for under this contract, to meet and maintain, under reasonable maintenance and operating conditions, commercially acceptable standards while such facilities may be used by the State to deliver program material for public viewing.

2. The Bartlett and Lena Point earth stations will be equipped to receive simultaneous dual channel programming. Transmission of such programming to the communities of Anchorage, Fairbanks, Juneau and Sitka will be on the basis of occasional use at times mutually agreeable by the parties hereto.

ARTICLE VI - NON-RENEWABLE AGREEMENT AND TERM

It is understood by all parties hereto that this agreement is for the purpose of a one year television demonstration project, the term of which shall begin upon commencement of service. This agreement is non-renewable. Alascom hereby agrees that it will use its best efforts to initiate full program use beginning January 15, 1977.

Provision for availability of the transponder for use in test and line-up of the 23 bush stations and associated system facilities shall begin January 10, 1977.

ARTICLE VII - CANCELLATION

The State shall have the right to cancel this contract for cause. Cause shall be deemed to be either (a) ten (10) consecutive days of pre-emption on the intra-state terrestrial equipment or (b) five (5) consecutive days of pre-emption on the satellite transponder.

Should a pre-emption of intra-state terrestrial equipment occur lasting ten (10) days or longer the State may cancel this Agreement and will not be responsible for monthly charges or portions thereof beyond the date of which notice of cancellation is transmitted to RCA Alascom.

Should pre-emption of the transponder occur lasting more than five (5) days or longer the State may cancel this Agreement and will not be responsible for monthly charges or portions thereof beyond the date of when notice of cancellation is transmitted to RCA Alascom.

The state may cancel this contract upon ninety (90) days written notice to RCA Alascom. The State will not be responsible for monthly charges beyond the day on which such cancellation is effective and any charges incurred pursuant to paragraph 3, Attachment IV.

ARTICLE VIII - USE OF OTHER SATELLITE OR TRANSPONDER

In the event Alascom is required to utilize any other satellite facility or transponder segment other than transponder 23 on Satcom F-2 as provided by RCA American Communications, Inc., the contract shall be subject to renegotiation as to monthly charges taking into account any new configuration required to accomplish the technical requirement to provide such service.

ARTICLE IX - GENERAL PROVISIONS

1. This Contract contains all terms, conditions, and agreements between the State ad RCA Alascom. It is recognized by both parties, however, that since this project is a demonstration project, that unforeseen difficulties may arise. Subsequent circumstances may require additional agreements. Any further agreement, however, in order to effect the provisions of this contract, must be in writing and signed by both parties.

3. This Contract and the provision of all services hereunder are subject to the approval of all appropriate state and federal regulatory bodies.

4. RCA Alascom shall not be responsible for providing any source program material.

5. The State shall hold RCA Alascom harmless from any such claim, demand or recovery sustained by RCA Alascom by reason of any violation of proprietary right, copyright infringement or any libelous matter contained in the programming.

6. Any damages to third parties arising out of the service provided by and under the control of RCA Alascom shall be paid by RCA Alascom and the State shall have the right to proceed against and collect from RCA Alascom for any monies paid by the State to compensate third parties for any such damages suffered except as to liability assumed by the State pursuant to paragraph 4 above and Attachment II, paragraph 3.

Page A

Dated at Juneau, Alaska, this 21st day of December, 1977.

STATE OF ALASKA

By: Robert Mintz
Office of Telecommunications

By:
Department of Administration

RCA ALASKA COMMUNICATIONS, INC.

By:
Vice President

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[illegible]

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6. [redacted]

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5. [redacted]

5. RCA Alascom will procure all other integration and installation materials and equipment not specified in item 2. above for completion of each village TV installation.

6. RCA Alascom will engineer, integrate, and install, in accordance with the general specifications defined in Attachment III, each village TV system (excluding the TV transmit equipment at those stations indicated by asterisks (*) in item 1. above). Installation specifications and drawings for each village may be reviewed by the State for adequacy. Any discrepancies noted by the State as pertains to integration or installation of the TV equipment may be submitted to RCA Alascom Engineering, in writing, within two working days after receipt by the State for any village in question.

   RCA Alascom will correct such discrepancies, prior to commencement of installation provided, however, that not having received notification of discrepancy from the State within the time specified, RCA Alascom shall proceed under the assumption that no changes are required.

   RCA Alascom will, in the installation of the TV transmitter equipment, comply with the specifications provided to the State for review and as may be amended by the State. Should RCA Alascom find that such specifications cannot be complied with due to unforeseen circumstances, RCA Alascom will use its best engineering judgment to complete installation as closely as possible to the specifications and advise the State of any deviations found necessary.

7. The State will prepare all TV transmitter FCC filings and obtain FCC authority to commence installation and turn-up at the twenty-three bush communities. Evidence of such authority in the form of Station Construction Permits or FCC letter(s) of 319(d) or equivalent authority shall be delivered to RCA Alascom within two (2) working days after grant by the FCC. No TV transmitter installation will commence without proper FCC authority.

8. RCA Alascom will perform testing of all village TV equipment received from the vendors (both State and RCA Alascom procured) promptly after receipt to insure vendor specifications are met. If failure of any State procured equipment to meet such specifications occurs, the State and its appropriate vendor will be promptly notified and the failed unit returned to the party specified by the State for repair and return under warranty action.

   RCA Alascom shall not be held responsible for any schedule slippage resulting from failure of State provided equipment to pass testing or be repaired/replaced in a timely manner.

   As a part of installation and turn-up in each village, RCA Alascom will perform as a minimum system operational testing as contained in Attachment III to determine if the system objectives are met. The results of such testing will be documented. Copies of this documentation will be provided to the State.

9. RCA Alascom has budgeted a total of twenty-three (23) maintenance revisits for the purpose of restoral of State owned TV equipment. The State and RCA Alascom may enter into a separate agreement for any further maintenance of other than RCA Alascom equipment.

10. Provided the requirements of items 2., 3., and 8. of this attachment have been met and excepting unusual weather delays or other factors beyond the reasonable control of RCA Alascom, schedule of installation of the TV facilities in the twenty-three (23) bush communities is subject to RCA Alascom using its best efforts:

By January 15, 1977:

Tenakee Springs
Mekoryuk
Kipnuk
*Holy Cross
Shageluk
*Chitina
*Tatitlek
Ambler
King Cove
*Perryville
*Larsen Bay
*Pilot Point
*Old Harbor
St. Paul
*Emmonak

By February 15, 1977:

Shungnak
Noatak
Cape Pole
*Nulato
Gambell
Savoonga
*Point Hope
Anaktuvuk Pass

RCA Alascom may substitute villages between the above groupings, as necessary in their opinion, to take best advantage of weather or other factors to avoid project delays.

11. Installation of television facilities at those stations indicated by asterisks (*) in item 10. above, will be accomplished, in so far as possible, concurrently with construction of the village earth station and subject to the small earth station schedule. Any factors reasonably beyond the control of RCA Alascom affecting the small earth station schedule will similarly affect the TV installation schedule.

12. RCA Alascom will assume full responsibility for the integrity of its installations and hold the State harmless for any injury or damage to property owned by others as a result of improper engineering or installation.

B. Major Earth Stations and Toll Offices

1. Television service under the TV Demonstration Project will be provided to the following major earth stations and RCA Alascom Toll Offices:

Fairbanks Toll Center
Anchorage Toll Center
Juneau Toll Center
Sitka Toll Office
Bethel Toll Office/Earth Station
Bartlett Earth Station
Lena Point Earth Station

. RCA Alascom will install appropriate equipment at the specified stations to provide television reception and/or origination, as applicable, in one or more of the following transmission formats:

a. Conventional TV Format - Wideband FM video signal with audio subcarrier for transmission to large earth stations only.

b. Bush Format - Medium bandwidth FM video signal with separate SCPC audio program channel for transmission to large and/or small earth stations. Video and audio channels will be assigned to separate transponders.

c. Dual Channel - Subject to Article V, two 1/2 transponder bandwidth FM video signals with separate SCPC audio program channels for transmission of two simultaneous TV programs to large earth stations only. Video and Audio channels will be assigned to separate transponders.

	Receiving Formats	Originating Formats
Bartlett Earth Station	A, B, or C	A or B
Lena Point Earth Sta.	A, B, or C	A or B
Bethel Earth Station	A, B, or C*	N/A

*Indicates receipt of only one of either of the two simultaneously transmitted channels.

3. The State will provide, and deliver to the Lena Point and South Mountain earth stations, one cabinet of CMI SCPC common equipment (up/down converters, channel shelf, power supplies, etc.) to support Program Audio channel modem units.

4. At the Anchorage, Juneau, Lena Point, Bartlett, Bethel and Fairbanks offices, RCA Alascom will install video/audio and/or format switching capability, as applicable, under push button control to reduce the switch and line up time to a minimum. Such switching facilities will be available for service by March 30, 1977. Until such time as the push button controlled switching is available, all changes in feeds or formats will be performed manually on a patching basis.

5. The State will provide to RCA Alascom in each request for services:

   a. The point of program origination.
   b. The time(s) and program titles desired.
   c. The point(s) of program delivery.
   d. The transmission format through the satellite desired.
   e. Any special switching or format changes desired during the scheduled period of the request.

6. RCA Alascom will arrange with RCA Americom for off-the-air pick-up of locally broadcast program material, as specified by the State in their requests for service for inter-state originated programs from Americom stations for transmission to Alaska. RCA Alascom will use its best efforts to insure that the signal performance of such pick-ups meet commercial standards of similar professional quality off-the-air feeds. It is understood, however, that such pick-ups may be subject to performance conditions beyond the control of RCA Alascom. Therefore, RCA Alascom will not be responsible for temporary, short-term performance degradation resulting from such factors as propagation fading, manmade noise sources or interference not controlled by RCA Alascom, multi-path fading or ghosting from aircraft in the receive path, etc.

ATTACHMENT III

A. SCOPE - This attachment will detail the technical parameters associated with each of the various television transmission formats listed in the body of the agreement and certain interface requirements at small earth stations.

B. TRANSMISSION AND RECEPTION - Where there is a requirement to transmit a particular format, the equipment shall be configured such that, when standard signals are applied, the emmission will conform to the parameters listed herein. Conversely, where the requirement is to receive a particular transmission format, suitable equipment shall be provided to correctly receive the signal. When an earth station is required to change either originate or receive transmission formats during scheduled usage of the system, the equipment shall be arranged in such a manner as to permit quick change between formats, preferably by push-button operation (subject to the provisions of Attachment II, B.4).

C. TERRESTRIAL INTERCONNECTION BETWEEN TOLL CENTERS AND EARTH STATIONS - The video and audio signals shall be carried by microwave or coaxial cable channels which conform to the broadcast performance standards contained in NTC-7. In the case of the TD-2 this shall be an objective instead of a standard.

D. OFF-AIR RECEPTION - Equipment which is provided for the purpose of off-air reception shall provide a reliable, interference-free, signal. To this end, the following specifications shall apply:

1. The antenna system shall be so located and designed such that under normal conditions it provides a strong, ghost-free signal in accordance with C.A.T.V. industry practice. If a single antenna will not provide adequate reduction of multi-path ghosts, multiple antennas giving higher discrimination of unwanted signals shall be installed.

2. A high quality, crystal controlled demodulator employing synchronous detection shall be used to eliminate operator tuning error and improve video quality. A Scientific-Atlanta 6200 Demodulator with appropriate channelized plug-ins or equal shall be provided. It is understood that the equipment currently in use is not of this type and that normal procurement lead time will place installation after January 15, 1977.

3. No video processing, other than clamping, shall be employed.

E. SINGLE CHANNEL VIDEO/SEPARATE AUDIO (BUSH) - The Bush Format is a modification of standard satellite television transmission parameters designed to reliably deliver television signals to small (4.5 meter) earth stations. The following parameters shall be used when Bush Format transmission is required:

1. The carrier frequency shall be 6385.0 MHz.

2. Peak deviation caused by a 762 KHz test-tone of 1 volt PP shall be 8.0 MHz. (In actual practice a -10.6 dBm signal will be applied at the 1 volt point and the modulator deviation adjusted to produce the first Bessel null.)

3. Industry standard, CCIR recommendation 405 (VIDEO) pre-emphasis, shall be applied to the video baseband.

4. Energy Dispersal consisting of a 30 Hz triangular waveform whose points of inflection coincide with the vertical blanking period shall deviate the carrier not more than 1.2 MHz peak-to-peak.

5. Transmit IF bandwidth shall be limited to 25 MHz by a properly equalized filter.

6. There shall be no audio subcarrier present when Bush Format is being transmitted.

7. The transponder shall at all times be operated for maximum video carrier output.

8. The audio signal shall be transmitted on a carrier whose frequency is 5994.180 MHz. California Microwave CMI 15203-02 SCPC program sound equipment shall be employed for transmission of the audio. This equipment operates in the FM mode and occupies a bandwidth of approximately 150 KHz and has a frequency response of ±1 dB from 100 Hz to 7.5 KHz. Operation shall be as specified by the manufacturer.

9. Originating earth stations shall transmit the program audio carrier at an EIRP which will produce a satellite EIRP of 12.0 dBw toward the Bartlett earth station.

10. Care shall be exercised to ensure that the signal levels applied when operating in the Bush Format produce accurate carrier deviations. This is necessitated by the fact that the demodulated signals at Bush locations are used to directly modulate a small television transmitter and, therefore, improper deviation will result in incorrect modulation percentages of the Bush transmitter.

F. DUAL CHANNEL VIDEO/SEPARATE AUDIO (DUAL CHANNEL FORMAT)

- This format allows the transmission of two television signals through a single satellite transponder. When transmission in this mode is required, the following parameters shall be employed. It is recognized that certain of these parameters may change as experience is gained with this format and that it would be in the interest of the State to promote improved operation of this system. Therefore, within 120 days after the contract becomes effective, RCA Alascom shall be allowed to make improvements in the system, with participation by the State. After that time, the State will retain the right to reject by written notice any proposed change if it is shown that such change will decrease the quality or reliability of this service.

But under no circumstances will RCA Alascom make major changes in the format which would increase the cost of the system. Use of the dual channel format is subject to the requirements of Article V.

1. There shall be two FM television carriers transmitted through the satellite simultaneously. One carrier shall be transmitted at 6394.5 MHz (+9.5 MHz from transponder center) and shall be designated CHANNEL A. The other carrier shall be transmitted at 6375.5 MHz (-9.5 MHz from transponder center) and shall be designated CHANNEL B.

2. The peak deviation caused by a 762 test-tone of 1 volt PP shall be 5.6 MHz for either carrier. (In actual practice a -7.5 dBm signal will be applied at the 1 volt point and the modulator deviation adjusted to produce the first Bessel null.)

3. Industry standard CCIR recommendation 405 (VIDEO) pre-emphasis shall be applied to the video base-band.

4. Energy dispersal consisting of a 30 Hz triangular waveform whose points of inflection coincide with the vertical blanking period shall deviate the carriers not in excess of 70[illegible] KHz peak-to-peak.

5. Transmit and receive IF bandwidths shall be limited to 17.5 MHz by a properly equalized filter.

6. Accurate equalization for transmit chain and satellite transponder group delay shall be incorporated in each transmit chain to minimize crosstalk between channels.

7. There shall be included in the CHANNEL B video path an ALD (Alternate Line Delay) unit to suppress crosstalk between the chrominance signals.

8. At all Alaska receive locations both channels shall have a chrominance averager in the video path to average out chrominance amplitude variations caused by crosstalk between channels. It is understood that this equipment is at the prototype stage and that some delay will occur before units can be obtained and installed.

9. There shall be no audio subcarrier present when Dual Television Format is being transmitted.

10. For those stations transmitting in this format, the transponder operating point shall be determined accurately and shall correspond to an input back-off of 7 dB from single carrier saturation for each carrier. When operating at this transmit power level, an in-house test translator loop, which includes all equipment except the antenna and LNA, shall show no more than 1/2 IRE crosstalk between asynchronous EIA color bars without the ALD in the video path.

11. The audio signals shall be transmitted separately in transponder 3 using California Microwave CMI 15203-02 SCPC program modulators supplied by RCA Alascom. Operation shall be specified by the manufacturer. The higher frequency audio carrier (5994.180 MHz) shall be designated CHANNEL A and shall be associated with video CHANNEL "A"; the lower frequency audio carrier (5993.520 MHz) shall be designated CHANNEL B and shall be associated with video CHANNEL "B".

12. Originating earth stations shall transmit the program audio carriers at an EIRP which will produce a satellite EIRP of 12.0 dBw toward the Bartlett earth station.

G. SINGLE CHANNEL VIDEO/SUBCARRIER AUDIO (STANDARD) - This format refers to the standard transmission parameters in use by RCA Alascom to deliver broadcast quality television. Performance shall be in accordance with NTC-7 objectives.

H. INTERFACE REQUIREMENTS AT SMALL EARTH STATIONS

1. The video input to the TV transmitter shall be flat within ±0.5 dB, 20 Hz to 4.5 MHz.

2. Power line induced hum in the video input to the TV transmitter shall not exceed -40 dBV.

3. Hum level at the audio input of the TV transmitter shall not exceed -50 dBmØ.

4. The TV transmitter antenna center shall be installed at least 25 feet above ground level and 10 feet above the building structure on which it is mounted.

5. The RF loss in the TV transmitter antenna feed system shall not exceed 1.5 dB at the transmit frequency.

I. TEST AND DOCUMENTATION

1. SATELLITE TV RECEIVER - Sufficient tests shall be conducted on the satellite TV receiver to ascertain proper operation after installation. These shall include as a minimum:

a. Ascertainment that any installation set-up procedure prescribed by the manufacturers has been properly performed (e.g. meter calibration, switch positions, etc.).

b. Ascertainment that all metering positions are at their nominal values.

c. Verification that the video output level is 1 volt PP in 75 Ohms when receiving a properly deviated test signal.

d. Measurement of C+N/N and C/kT at the IF test port using a power meter and a spectrum analyzer respectively, while receiving a saturated carrier.

e. Measurement of weighed video S/N.

f. Ascertainment that the picture is free from any impulses when standard color bars are received.

3. PROGRAM AUDIO DEMODULATOR - Sufficient tests shall be conducted to ascertain proper operation after installation. These shall include as a minimum:

a. Determine that any installation set-up procedures specified by the manufacturer have been properly performed.

b. Verify that the audio output level is set to 0 dBm in 600 Ohms when receiving a properly deviated test tone.

c. Measure test-tone-to-noise ratio with compander off.

d. Verify that the audio output with fully modulated tone is free from audible clicks.

3. MINI-TV TRANSMITTER - The following tests and measurements shall be performed on the Mini-TV transmitter after it is installed:

a. Determine that proper visual and aural modulation is established with signal from the satellite TV receiver and program audio demodulator.

b. Measure visual power output and determine that the visual/aural power ratio is correct.

c. Measure antenna VSWR.

d. Using a spectrum-analyzer, verify that the Mini-TV transmitter output signal is free from spurious output exceeding -50 dB relative to peak visual power. Also verify that the sideband response is within +2 dB of 4.00 MHz using a multi-burst test signal.

e. Verify that the visual carrier frequency is within 0.005% of the assigned frequency and that the visual/aural inter-carrier frequency is within ±1.0 KHz of 4.5 MHz.

4. SYSTEM CHECK-OUT - After installation and the above testing is complete, a general system verification shall be made. This should include transmission of test signals through satellite and Mini-TV received on a TV set at the village. The picture and sound should be critically evaluated for freedom from obvious defects. Any uncorrectable defects shall be noted.

Charges From Contiguous 48 States

All charges for service in the contiguous 48 states will be paid thirty (30) days in advance based upon estimated utilization subject to monthly adjustment based upon actual utilization.

1. $5,000.00 monthly or $75.00 hourly for one off-the-air pre-emptible channel per one transponder.

2. $5,000.00 monthly or $25.00 hourly for the first off-the-air pre-emptible channel of two channel per transponder.

3. $50,000.00 one-time charge plus $25.00 hourly for the second channel of two channel per transponder service with the right to salvage the equipment required to combine for dual channel programming less the actual removal and delivery costs to the state not to exceed $5,000.00 at the end of the contract term or upon cancellation pursuant to Article VII.